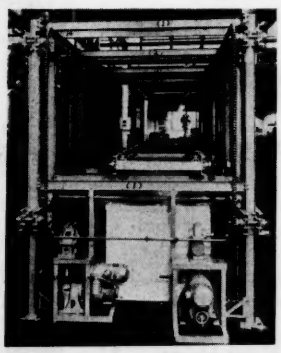
Metals Review
THE NEWS DIGEST MAGAZINE

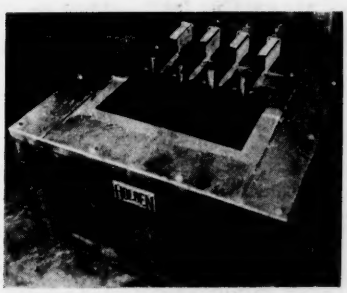
Volume XXIII - No. 6 June 1950

HOLDEN POT FURNACES AND CONVEYORS

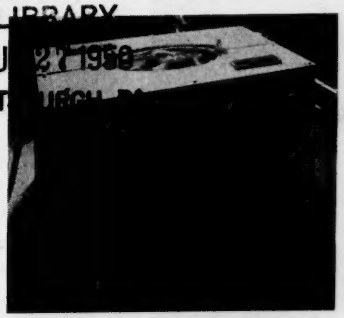
APPLICATIONS—Hardening . . . Annealing . . . Descaling . . . Martempering . . . Austempering . . . Isothermal Annealing and Descaling . . . Stainless Steel Descaling (Sodium Hydride) . . . Sand Removal . . . Bluing . . . Blacking . . . Carburizing



HOLDEN Electrode Furnace with Automatic Conveyor

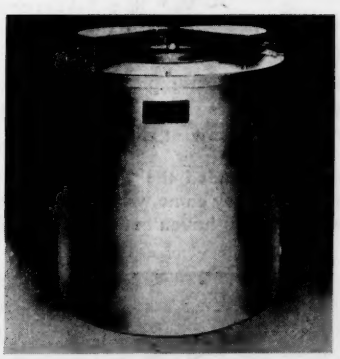


HOLDEN Electrode Furnace

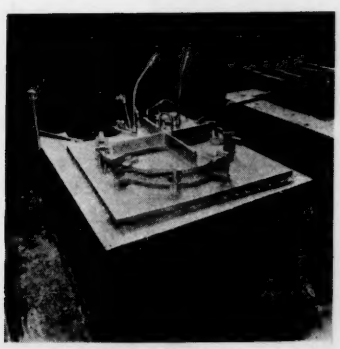


HOLDEN Gas-Fired Furnace

HOLDEN Marquenching or Austempering Furnace—Gas or Electric



HOLDEN Electric Resistance Furnace



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(See back page for WINNER of Television Set . . .)

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Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIII, No. 6 **JUNE, 1950**

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AT LAST!

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For further details, see *Metals Review,* February 1950, page 4, and *Metal Progress,* May 1950, page 613.

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A.S.M. National Officers Nominated for 1950-51

Walter E. Jominy, staff engineer, Chrysler Corp., Detroit, has been nominated for president of the American Society for Metals, to serve for one year, starting in October 1950. At the same time, John Chipman, head, department of metallurgy, Massachusetts Institute of Technology, has been nominated for a one-year term as vice-president, and William H. Eisenman for a two-year term as secretary.

Two new nominees to the board of trustees, to serve for two years each, are James B. Austin, director of research, U. S. Steel Corp. Research Laboratories, Kearny, N. J., and James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.

Also on the board of trustees are Ralph L. Wilson, chief metallurgist, Timken Steel and Tube Co., Canton, Ohio, who will be starting the second of two years as treasurer; Arthur E. Focke, chief metallurgist, Diamond Chain Co., Inc., who will serve as past president; and two trustees whose terms will expire next year, namely, Elmer Gammeter, chief metallurgist, Globe Steel Tubes Co., Milwaukee, and Thomas G. Digges, chief, thermal metallurgy section, National Bureau of Standards, Washington.

Walter Jominy, whose name is synonymous in metallurgical circles with the end-quench test for hardenability, took his master's degree at University of Michigan in 1916. He later did important work on scaling of steel in the University's department of engineering research (1923-31) and also as research metallurgist for A. O. Smith Corp. (1931-34). From then until he joined the Chrysler Corp. in 1941, he was metallurgist in the research laboratories division of General Motors Corp. He is a recipient of both the Albert Sauveur Achievement Award of the A.S.M. and a Distinguished Service Award for meritorious contributions to progress in alloy steels.

Dr. Chipman, the nominee for vice-president, is an authority on physical chemistry of steelmaking. He has devoted most of his career to academic teaching and research, with the exception of the years 1934 to 1937, when he was associate director of the research laboratories of Armco Steel Corp. He received his Ph.D. from University of California in 1926, was assistant professor of chemistry at Georgia School of Technology in 1926-29, research engineer at University of Michigan in 1929-34, and professor of process metallurgy at M.I.T. from 1937 until he was named head of the department in 1946.

He is a past trustee of A.S.M., presented the Campbell Memorial Lecture in 1942, and holds the Henry Marion Howe Medal for the best paper published in the *Transactions*, as well as the Robert W. Hunt Award of the A.I.M.E.

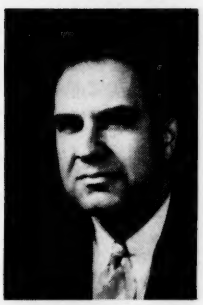
John Chipman
For Vice-President

Walter E. Jominy
For President

William H. Eisenman
For Secretary

J. T. MacKenzie
For Trustee

Some Notes About the Professional Careers of the Men Nominated for Top Offices in the A. S. M. Are Given on This Page. Election rules and personnel of the Nominating Committee were published in the June issue of Metal Progress.



J. B. Austin
For Trustee

James T. MacKenzie, nominated as trustee, is a graduate of University of the South, Sewanee, Tenn., where he received his bachelor's, master's and doctor's degrees. He began his career as an analyst for American Cast Iron Pipe Co. in 1912, served as chief chemist and metallurgist from 1915 until 1940, and as chief metallurgist since that date. Dr. MacKenzie is an outstanding authority on ferrous foundry problems, serving on various committees in this field and contributing important papers to the literature. He was the first chairman of the Birmingham Chapter A.S.M. and has served on the national Handbook Committee, as well as taking a leading part in the activities of a number of other technical societies.

The second selection for trustee, James B. Austin, is directly responsible for the vast amount of fundamental research sponsored by U. S. Steel Corp. A graduate of Lehigh University, he received his Ph.D. from Yale in 1928. He immediately joined the newly organized U. S. Steel Laboratories, was made assistant director in 1944, and director in 1946. That same year he was selected to present the A.S.M. Campbell Memorial Lecture.

Educational Work Praised

The value of A.S.M. chapter educational courses to the community is attested by a letter recently received by Carl O. Sundberg, chairman of the Educational Committee of the Indianapolis Chapter. The letter, written by the vice-president of P. R. Mallory & Co., Inc., states:

"The Indianapolis Chapter of the American Society for Metals is certainly to be commended on this very worth-while educational project. Programs of this type are of tangible, instructive benefit to the industrial organizations of this city, and their furtherance is a real civic contribution."

The 1950 educational program of the chapter was entitled "Heat Treatment of Steels"; details were published in the May issue of *Metals Review*, page 13.

Horger Speaks in Texas

Reported by Arthur C. Willis
Instructor, Southern Methodist University

A joint meeting of the North Texas Chapters of A.S.M. and of the American Society of Mechanical Engineers was held on April 19 in Fort Worth. Approximately 100 attended the meeting to hear O. J. Horger, chief engineer of the railway division, Timken Roller Bearing Co., speak on "Fatigue Analysis and Photo-Elastic studies". Dr. Horger's talk has been reported when presented before other chapters of the society.

New Chapter Receives Charter

W. C. Kimball (Left), Acting Chairman of the Newly Formed Northern Ontario Chapter, Accepts the Charter from National President Focke

Reported by W. G. Davey
Algoma Steel Corp., Ltd.

The newly formed Northern Ontario Chapter of the American Society for Metals held its charter meeting on April 27 at Sault Ste. Marie, Ont., with 75 members present. National President Arthur E. Focke, chief metallurgist of Diamond Chain Co., Inc., presented the charter to Acting Chapter Chairman Walter C. Kimball, quality control metallurgist of Algoma Steel Corp., Ltd.

In presenting the charter, Dr. Focke attributed the success of the A.S.M. to (a) its educational program, (b) the interest and enthusiasm of the 20,000 members, (c) the leadership of hard-working Bill Eisenman, and (d) the support of the metal industries.

Dr. Focke then presented the main address on "The A.S.M. and the Metals Industry".

Two A.S.M. Books Rated Among 100 Best of Year

Two books published by the American Society for Metals have been selected to rank among the "100 Best Technical Books of the Year". They are "Stainless Steels—an Elementary Text for Consumers" by Carl A. Zapffe, and "Cold Working of Metals", which comprises the papers presented at the seminar sessions on this subject last fall during the National Metal Congress.

The list of best books has been compiled by Reginald Hawkins, head of the science and technology division of the New York Public Library. It was published in the Spring Technical and Business Book Issue of the *Library Journal*.

Metal Crystals Perform Under Microprojector

Reported by C. G. Atchinson
Assistant Chief Metallurgist Sheffield Steel Corp.

Members and guests at the March meeting of Kansas City Chapter A.S.M. saw first-hand performances of the growth of metal crystals, solid phase transformations, solid solutions, and eutectics. Using a microprojector and various low-melting compounds for the demonstrations, K. E. Rose, chairman of the department of mining and metallurgical engineering at the University of Kansas, explained that the phase reactions in metals closely parallel those that were observed on the screen.

Growth of tin dendrites, followed by examples of silver and copper dendrites—all produced by electrodeposition between glass slides—opened the demonstration. The regular geometric pattern of crystals was clearly shown by the directional branching of these skeletal forms. This was followed by examples of freezing in several organic substances selected to illustrate the evolution of grain structures and grain boundaries. Solid solutions were shown to be crystals with more than one distinct component.

Eutectic reactions and solid-phase transformations appeared in striking colors when viewed by polarized light. Some of the solid-phase transformations were extremely rapid; others progressed slowly enough for detailed observation.

Foundrymen and heat treaters were especially interested in the changes in volume produced by the phase changes, and in the action of gas inclusions during freezing.

A.S.M., A.S.T.E. Hear About Cutting Tool Materials

Reported by Arthur C. Willis
Instructor, Southern Methodist University

A talk on "Materials for Precision Cutting Tools and Gages" formed a fitting occasion for a joint meeting of the North Texas Chapters of A.S.M. and of the American Society for Tool Engineers in Dallas on April 28. Speaker was A. H. d'Arcambal, general sales manager of the Niles-Bement-Pond Co., and long-time consulting metallurgist for Pratt & Whitney Division, who is also a past national president of both A.S.M. and A.S.T.E.

Dr. d'Arcambal's topic encompassed the principal types of toolsteel, both carbon and alloy, as well as the nonmachinable materials such as cast nonferrous alloys, carbides, norbide and sapphire. Proper heat treatment of high speed steel (both molybdenum and tungsten) and surface treatments were described and illustrated with slides.

Speaks on Titanium

Raymond S. Stewart

Reported by Malcolm G. Simons
Pressed Metals of America, Inc.

One of the most important attributes of titanium and its alloys is its corrosion resistance, particularly with respect to sea water and other chlorides, Raymond S. Stewart pointed out in addressing the Detroit Chapter A.S.M. on April 10. Mr. Stewart, who is assistant chief, physical metallurgy division, Titanium Alloy Mfg. Div., National Lead Co., spoke on "Metallurgy, Properties and Applications of Titanium and Titanium Alloys".

Mr. Stewart gave a brief history of the metal and related many interesting facts pertaining to its characteristics, occurrence, availability, and methods of extraction, application, and recent developments in production and fabrication.

A coffee talk presented by Capt. Lamar E. Bailey, director of public relations, City of Detroit Fire Department, brought forcibly home to those present the ever-present potential of fire and the precautions everyone can take to prevent it.

Promoted by Alcoa

Kent R. Van Horn, Past President A. S. M., Has Been Named Associate Director of Research for Aluminum Co. of America, New Kensington, Pa. Dr. Van Horn is at present an assistant director of research and has been in charge of Alcoa's branch laboratories in Cleveland since 1945. He is a past chairman of the Cleveland Chapter A. S. M., and served as national president in 1944.

Procedures for Purchase Of New Furnace Equipment Outlined by Stevenson

Reported by G. W. Birdsall
Reynolds Metals Co.

Some of the factors to be considered in purchasing industrial furnace equipment were outlined before the Louisville Chapter A.S.M. on April 4, in a practical talk by C. H. Stevenson, vice-president, Lindberg Engineering Co. Mr. Stevenson introduced his subject by describing some of his European experiences, which indicated that American furnace manufacturers were, in general, much further advanced than European.

The Germans, however, had developed an improved, normal-frequency electric induction furnace for melting aluminum that has been widely adopted here. This furnace has two melting chambers with the electric windings so arranged that metal is held at a level several inches higher in one chamber than the other when the power is on. When the power is turned off, the metal seeks its own level, flushing out the unit. An automatic timer shuts off the power once every minute to produce this flushing action, thus preventing the furnace from drossing up and making it easier to clean.

Of significance also is the new Dow furnace that uses a lot of firebrick to store an immense amount of heat. This produces a "flywheel" effect; when a heavy load is charged into such a furnace operating at 1600° F., because of the tremendous *amount* of heat stored in the firebrick, furnace temperature will fall only about 50°. A conventional furnace would drop 300 to 400° under the same conditions, he pointed out.

Purchase of new furnace equipment can be justified on various counts, according to Mr. Stevenson, such as elimination of finishing troubles, reduction of machining cost and of rejects, lower operating costs, reduced floor space, improved working conditions, reduced fuel costs, and production of a better product at a lower price.

The prospective purchaser, Mr. Stevenson recommended, should get in touch with several reputable furnace manufacturers and state exactly what he hopes to accomplish with the new equipment. The manufacturers should supply him with their recommendations and specifications, together with their reasons for these specifications. The purchaser can then draw up his own set of specifications and ask for bids from all the furnace manufacturers on the same fair basis.

There are no mysteries about furnace specifications, the speaker mentioned. Heat loss through furnace walls, for example, can be figured by any engineer with the data available from the suppliers. Type of furnace, size, firing, handling and control equipment, insulation size and amount, size and type of heating element, and refractories can all be figured after a study of manufacturers' recommendations, and there is no reason why a prospective purchaser should not feel qualified to write his own specifications on this basis.

New Films

Lathe Turning

A series of 16-mm. motion picture films on turning equipment for the metalworking industries is in process of being completed by Monarch Machine Tool Co. The series will consist of nine reels, varying in running time from 10 to 23 min. Five of the films have been completed on the following subjects:

"The Air-Gage Tracer"—running time 23 min.

"The Speedi-Matic"—running time 23 min.

"The 10-In. Model EE Sensitive Precision Toolmaker's Lathe"—running time 22 min.

"Mona-Matic Magic"—two films, each approximately 18 min., showing operations performed on the Monarch Mona-Matic lathe.

Prints are available from Monarch Machine Tool Co., Sidney, Ohio.

Die Casting

Doehler-Jarvis Corp. has signed a contract with the Jam Handy Organization calling for the production of a motion picture on the die-casting process. The picture is tentatively set to include two and a half reels requiring about 25 min. for projection; it should be ready for distribution by early autumn. Requests for showings should be addressed to Doehler-Jarvis Corp., 386 Fourth Ave., New York 16.

Pittsburgh Poll-Takers

Tabulating the Results of a Poll at a Recent Meeting of the Pittsburgh Chapter A. S. M. Are (Left to right): Mal Hawkes of Carnegie Institute of Technology, Cleve McKenna of Vanadium-Alloys Steel Co., and Art Wilder of National Tube Co. The poll was a feature of National President's Night and was taken on the unconventional method of presentation adopted by President Focke. (Reported by Robert M. Allen)

Ten Texas Chairmen Honored

Ten Past Chairmen Were Honored by the Texas Chapter in March. Standing (from left) are: Charles Lewis, Glen R. Ingels, K. P. Campbell, F. M. Wittlinger, C. H. Shapiro, and R. W. Schlumpf (first chairman). Seated are W. E. Burndrett, Carl S. Cook, Wade W. Hampton, and G. C. Harrington

Reported by Leland V. Dolan
Dolan Industrial Sales

"You can't do a thing in life without toolsteel. There is need for the ax, the hammer and all types of cutting tools. Machine tools would be useless without toolsteel." The truth of these axioms was borne out by H. J. Stagg of Crucible Steel of America, in a colorful talk presented before the March meeting of the Texas Chapter A.S.M.

Of the three steps in heat treating tools—heating, quenching and tempering—the second is the most important, Mr. Stagg said. Almost every crack that occurs in the tool starts between the time the tool is removed from the furnace and is put into the draw. Most troubles (other than design errors) occur in quenching while the tool is either too hot or too cold.

If it is quenched and allowed to stay at room temperature very long before tempering, the part may break. If the tool is tempered before the temperature drops to 400 or 450° F., only the percentage of martensite that has formed at that temperature will be obtained.

Nature has provided the tool heat treater with a wonderful instrument in the human hand, according to Mr. Stagg. When the tool has cooled just to the point where it can be held without burning the hand, it is ready to temper.

Mr. Stagg recommended that the tool be tempered *after* grinding, where possible. Grinding creates stresses. A split ring ground on the outside will open up after grinding, and a split ring ground on the inside will close.

The meeting was also Past Chairman's Night, and after the dinner Chairman W. A. Kuenemann introduced each of the ten past Chairmen present.

Molding and Pattern Making Demonstrated

Reported by D. A. Thompson
Department of Civil Engineering
University of Manitoba

Some 85 members were present at the Manitoba Chapter A.S.M. April meeting, when three local members described and performed actual demonstrations of molding and patternmaking in the metals industry.

George Behrends, of Western Canada Bronze, Winnipeg, discussed statuary molding and processes used in the production of bronze statues and monuments. Glyn Harris, of Anthes Imperial Co., described the manufacture of cast iron soil pipe, from the building up of the molds to the finished product. Bill Lorimer, of Vulcan Iron & Engineering Co. Ltd., talked on lathe bed molds, cylinder molds, and various other types used in the machine manufacturing industry.

A discussion period followed and the evening was ended with a colorful movie tracing the manufacture of steel from the mine to the rolling mill.

Serves Chapter 15 Years

Harold M. Malm, Manager of Little Falls Alloys, Inc., Paterson, N. J., is stepping down to the sidelines after 15 years serving in various offices for the New York Chapter A. S. M. He is a past chairman (1943), has served on the Executive Committee, and his most recent duties were as secretary of the chapter, the office he now relinquishes.

THIRTY YEARS AGO

Notes Gleaned From Early Issues of the Proceedings of the Steel Treating Research Society and the Journal of the American Steel Treaters Society, Ancestors of A. S. M.

The Lehigh Valley Chapter, born Jan. 30, 1920, was headed by JOHN E. HALBING, assistant superintendent of heat treating (now assistant general manager), Ingersoll-Rand Co., as chairman, and ALBERT P. SPOONER, then and now metallurgical engineer for Bethlehem Steel Co., as secretary.

—30—

HALBING'S name also appears as author of a "Practical Talk on Some Modern Methods of Heat Treatment" printed in the *Journal*. A note states that he was assisted in the preparation of the talk by "FRANK" SHEPHERD, assistant metallurgist—better known to modern members of A.S.M. as Past President "BEN" (for Benjamin Franklin) SHEPHERD, now chief metallurgist at Ingersoll-Rand.

—30—

New England was the scene of concentrated activity in early 1920 with new chapters springing up almost simultaneously in New Haven, Providence, Boston, Springfield and Bridgeport. Names of many of the charter members of these chapters are now obscure; others such as Major H. COWDREY, then instructor, now professor emeritus at Massachusetts Institute of Technology, Boston Chapter secretary; and HAROLD FISH, now a life member of the New Haven Chapter, are well remembered.

—30—

Ontario was the first Canadian chapter of the Society. A. LOWRY, then and now with Massey-Harris Co., Ltd. (sustaining member), was secretary-treasurer.

—30—

National Secretary W. H. EISENMAN was more than busy directing the organization of one new chapter after the other. An established and proven plan of action started with a preliminary dinner attended by those who were already members of the society and other invited guests. A temporary organization was effected and officers appointed. A week later all interested individuals were invited to attend the meeting to be addressed by Secretary Eisenman on the subject "Heat Treatment—Past, Present and Future".

—30—

An obituary eulogizes ERNEST T. CLARAGE, president of Columbia Tool Steel Co. and a member of the society since its inception, who died suddenly on Jan. 28, 1920. His interest in and support of the society were continued by his son, ARTHUR T. CLARAGE, who served as a national treasurer during the mid-thirties.

Weld Failures Shed Light on Stresses And Notch Effects

Reported by H. R. Clauser
Materials & Methods

Recent welding developments of direct interest to metallurgists and engineers were ably described by G. E. Claussen, metallurgist, Reid-Avery Co., at the April meeting of the New York Chapter A.S.M. The meeting was held jointly with the New York Section of the American Welding Society.

Dr. Claussen described in some detail the inert-gas arc welding process and its use for joining difficult-to-weld metals such as aluminum and magnesium. The latest development, he explained, is the use of consumable metal electrodes in place of a nonconsumable tungsten electrode. Principal advantages of the process are its rapidity and the high weld quality obtained.

An interesting and informative portion of the paper was devoted to a review of past welding difficulties in the light of recent developments in materials and design. Dr. Claussen said that much has been learned about the effect of locked-up stresses and notch sensitivity through past weld failures, and that we can now be assured of high-quality welded structures by applying this experience.

The relatively new low-carbon stainless steels have aroused a great deal of interest recently. The carbon content of these steels runs around 0.03% as compared to 0.06 to 0.10% in the conventional types of stainless. This low carbon eliminates the need for expensive stabilizing elements and post-welding anneals, ordinarily required to avoid intergranular corrosion.

Surfacing by welding, and the latest methods of cutting and welding stainless steel, were also covered by the speaker. A color motion picture entitled "The Welding Arc" illustrated the talk.

Los Alamos Instructed on Recent Developments in Steel Industry Technology

Reported by D. W. Grobecker
Metallurgical Engineer
Los Alamos Scientific Laboratory

Confessing to a talk without title or subject, Augustus B. Kinzel none the less ranged the gamut of recent technological changes in the steel industry. Dr. Kinzel, president, Union Carbide and Carbon Research Laboratories, Inc., was speaker for the April meeting of the Los Alamos Chapter A.S.M. To the Los Alamos members, who for the most part specialize in fields remote from the steel industry, such a general discussion was of great interest.

As the readily obtained high-grade iron ore deposits of the United States are approaching depletion, we will have to depend in the future on foreign ore sources or on the domestic taconite deposits, Dr. Kinzel stated. The mining costs of taconite have been reduced by the use of a petroleum jelly-oxygen torch in place of a drill. The torch melts the taconite and blows the molten material from the cut. Certain taconites have proven susceptible to sink-and-float concentration an economical means of enriching the ore.

An outstanding development in blast furnace operation has been the increase in top operating pressures. By controlling the gas outlet of the blast furnaces so that higher pressures are obtained, the furnace output can be increased with a reduction in dust loss and saving in coke.

Use of oxygen in the electric furnace has proven a highly effective means of lowering carbon and raising the bath temperature. In the open-hearth the nuisance effects of high dust losses are introduced.

The general tendency in steel melting today is toward larger units which have introduced problems of bath segregation. Investigations are now under way to gain more information on the deoxidation of steel, and it is possible that present-day views concerning the mechanism of the silicon, manganese, and aluminum deoxidation may be revolutionized.

Although there have been few changes in the technology of low-alloy steels since the war, new design concepts may make them more economical for structural applications. Recent modifications of design factors utilize the high ratio of yield to ultimate strength found in low-alloy steels instead of basing design strengths entirely on fractions of the ultimate strength.

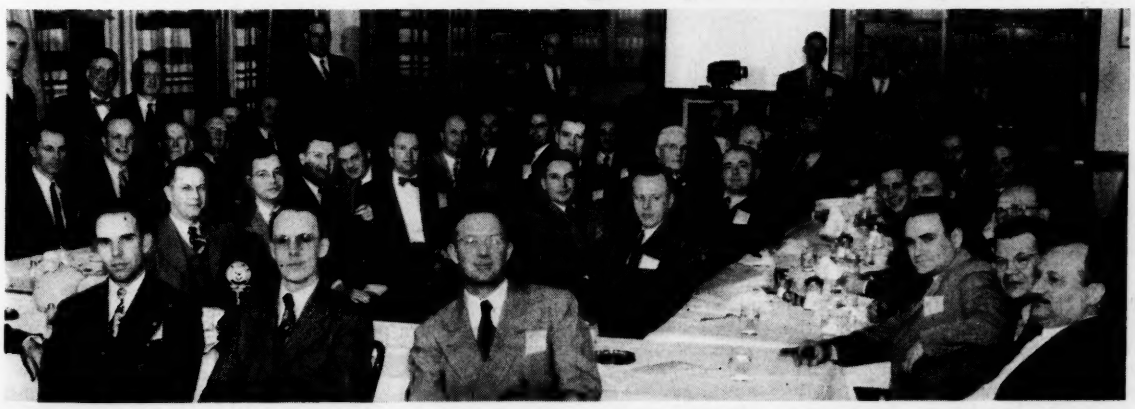
Materials Testing Lectures

Reported by F. R. Morral
Associate Professor
Department of Materials Engineering
Syracuse University

Some 120 members and nonmembers of A.S.M. registered for a course of five lectures in April and early May sponsored by the Syracuse Chapter. The first three lectures were presented by B. J. Lazan, head of the department of materials engineering at Syracuse University on "The Role of Materials Testing in Engineering".

The first Wednesday in May W. C. Wheadon, also of Syracuse University, gave a lecture demonstration on "Nondestructive Testing and Inspection", and Professor Morral concluded the series on May 10, speaking on "The Influence of Mechanical and Heat Treatment on Properties and Their Effect on Service Behavior".

National President's Meeting, Puget Sound Chapter



A Panoramic Photo of President's Night at the Engineers Club in Seattle, Wash., on March 31. National President Arthur E. Focke (second from left, in foreground) spoke on "The Tempering of Steel"

Tin Can Engineering Explained

At April Meeting of the Calumet Chapter Are (From Left): E. T. Schwendemann, Metallurgist, Inland Steel Co., Chapter Treasurer; E. W. Taylor, President, S. G. Taylor Chain Co., Chairman; H. S. Van Vleet, Manager of Research, American Can Co., Speaker of the Evening; and J. A. Eckel, Superintendent, Galvanizing Department, Carnegie-Illinois Steel Corp., Technical Chairman. (Photo by Steve Yatsko)

Reported by D. B. Graves
Federated Metals Division
American Smelting & Refining Co.

The rapid growth of the can manufacturing industry owes much to some important mechanical advances, Harley S. Van Vleet, manager of research, Atlantic Division, American Can Co., told the members of the Calumet Chapter A.S.M. on April 11.

Four per cent of the total steel production is used in the making of tin plate, he mentioned. In the early 1800's production was only five to six cans per hr., as against today's 20,000 cans per hr. The consumption of solder has been reduced to only 1 lb. for every 1000 cans. The raw materials used in producing the tin can are tin plate, solder, sealing compounds, and organic finishes.

Corrosion and strength of the material are the most important properties of the tin can. Dr. Van Vleet illustrated with slides the effects of various impurities on the corrosion properties under controlled conditions. Material containing only 0.09% silicon showed marked intergranular corrosion. Specifications for various impurities in the steel are low; for example, silicon 0.01% max., phosphorus 0.015 max., and copper 0.06 max.

Service life of the tin can has been increased over the years by better tin-plate, organic finishes, and stronger ends. Strong ends are needed to resist pressures which sometimes build up inside the can because of the nature of the product contained. A higher phosphorus concentration (about 0.12%) and temper rolling make for stiffer ends.

The amount of tin used on the average can has been greatly reduced, Dr. Van Vleet stated, principally by the electrolytic process of plating the steel. Because of the corrosion problem in all wet packs, organic finishes such as enamels and lacquers are used as a protective coating over the inside tin plate.

Except for evaporated milk cans, the tops are sealed with a rubber compound instead of solder. Synthetic rubber compounds have proven to be the best sealing agents, he said. The outside soldered seams of the cans are sealed with a 5% tin, 95% lead solder, while a 37% tin, 63% lead solder is used for inside seams.

Practical Metallurgy Translated

The book entitled "Practical Metallurgy" by George Sachs and Kent R. Van Horn, published by the American Society for Metals, has recently been translated into Japanese. Two thousand copies of the Japanese translation have been printed, and are available from the Tokyo publisher, Corona Sha.

Addresses Home Chapter

Reported by E. K. Spring
Chief Metallurgist
Henry Disston & Sons

Frank G. Tatnall, manager of testing research, Baldwin Locomotive Works, addressed the Philadelphia Chapter A.S.M. on April 28 on "Testing—Up-to-Date and Simplified". While Mr. Tatnall's subject has been presented before numerous other A.S.M. chapters, this was his first appearance before his home chapter as a speaker. The former chairman's "homecoming" therefore was treated accordingly with awards of gigantic strain gages and oversize medals and other tokens of affection for an erudite common man, a good fellow and a technician of ability.

Nickel Illustrates Tremendous Growth Of Electroplating

Reported by James Murray Hines
Sales Engineer, C. I. Hayes, Inc.

A pleasing departure from purely metallurgical subjects was tried at a meeting of the Rhode Island Chapter A.S.M., when Henry Strow, chief chemist of MacDermid, Inc., spoke on "Practical Aspects of Electroplating".

Plating has gradually developed from an ancient art into one of the modern sciences, the speaker pointed out. Most improvement in this respect has been accomplished with nickel plating. Approximately 10% of the total annual production of nickel (approximately 20,000,000 lb.) is used in electroplating. The automobile industry is the largest consumer, and 75% of this nickel plating is followed by a protective bright chromium plate for wear and corrosion resistance.

In the jewelry industry the precious metals, particularly silver, gold, and rhodium, are used for decorative effect. Here again nickel plate is often used as a base for silver and rhodium, since it provides a smooth, hard surface which improves the wearing properties of the finished article.

In the hardware industry bright plates of zinc or cadmium or nickel, are used for decoration or sales appeal, as well as for corrosion resistance. For plumbing and cooking equipment the nickel plate and chromium plate are used to add sales appeal and corrosion resistance.

The noticeable improvement of the chromium plate used in these various products is a tribute principally to the tremendous improvements made in electroplating of nickel. These include the use of hot nickel baths, simpler plating formulas, wetting agents, and a heavier nickel plate in preparation for the subsequent chromium plate.

In conclusion, Mr. Strow mentioned some special plating applications, such as the electroplating of indium as a replacement for tin on lead bearings, and the electrotinning of steel plate for the food industry. Chromium is also plated on certain tools or molds for improved corrosion resistance and wearing properties. Magnesium and some of the other light metals can be plated, if necessary, the speaker stated.

Coffee talk for the evening was given by Prof. J. S. Coles of Brown University chemistry department. He outlined some of the experimental and test work carried out at the Woods Hole Oceanographic Laboratory and aboard the floating laboratory ship Atlantis on under-water explosions.

Compliments

To HARRY B. OSBORN, JR., technical director of the Ohio Crankshaft Co., on his election as president of the Cleveland Technical Societies Council.

♦ ♦ ♦

To NATHANIEL C. FICK, deputy executive director of the Committee on Basic Physical Sciences, Research and Development Board, U. S. Department of Defense, on the presentation of a 15-min. radio broadcast on April 15 over Station WPIK in Alexandria, Va., entitled "Secrets of Success".

♦ ♦ ♦

To the LEBANON STEEL FOUNDRY, Lebanon, Pa. and its president, WILLIAM H. WORRILOW, on receipt of the 1949 award of merit conferred by the American Association for State and Local History, for the excellence of company publications promoting interests of the community.

♦ ♦ ♦

To E. G. DECORIOLIS and ORVILLE E. CULLEN of Surface Combustion Corp., on the honorable mention awarded by the Wire Association for their paper on "Protective Atmospheres for Annealing Nonferrous Wire" presented at the 1949 annual convention of the Association.

♦ ♦ ♦

To the HUNT-SPILLER MFG. CO. of Boston, the nation's second oldest producer of iron castings, on the observance of its 140th anniversary.

♦ ♦ ♦

To SAM TOUR, chairman of the board of Sam Tour & Co., Inc., New York, on his election as chairman of the Inter-Society Corrosion Committee of the National Association of Corrosion Engineers.

♦ ♦ ♦

To W. A. DARRAH, president of Continental Industrial Engineers, Inc., Chicago, and to A. H. KOCH, sales manager of standard industrial equipment, Surface Combustion Corp., on their election to the Industrial and Commercial Hall of Flame by the American Gas Association at its recent sales conference in St. Louis, Mo.

♦ ♦ ♦

To ALBERT M. PORTEVIN, dean of French metallurgists, editor of *Revue de Metallurgie*, and foreign correspondent in France for *Metal Progress*, on the award of the platinum metal for service to metallurgy, highest award of the British Institute of Metals.

Opens Canadian Company

Formation of a new company for engineering, fabrication and erection of gas plant equipment, the Gas Machinery Co. (Canada), Ltd., in Hamilton, Ont., has been announced by the parent company in Cleveland. Heading the new company as president is Donald H. Thorburn, a member of the Executive Committee of the Ontario Chapter A.S.M. for six years.

Turbo-Hearth Process Makes Steel Low in Nitrogen & Phosphorus

Reported by L. P. Lee
Joseph T. Ryerson and Son, Inc.

The new turbo-hearth process of steelmaking was explained before the members of the Chicago Chapter A.S.M. by a man whose contributions to its development are recognized as distinctive and important. He is Shadburn Marshall, research associate, Carnegie-Illinois Steel Corp. who addressed the April meeting of the chapter.

Dr. Marshall defined the turbo-hearth process as a new pneumatic method for producing steel of low nitrogen and phosphorus contents from pig iron of nominal "basic" composition. A basic hearth is used, and air is introduced onto and over the charge by means of jets placed at one side of the hearth.

Heats of steel were made in a 1000-lb. turbo-hearth at Battelle Memorial Institute under a cooperative research program. Numerous heat logs showed that the process is quite different from either the acid bessemer or basic Thomas processes, both of which require special charge materials. As much as 97% phosphorus elimination and up to 50% sulphur removal are attained without an increase in nitrogen content. Carbon and phosphorus elimination occur simultaneously and no afterblow is necessary for the removal of the latter.

These small-scale tests having shown the process to be chemically and metallurgically feasible, larger heats, up to 30 tons, were made at the South Chicago Works of Carnegie-Illinois Steel Corp. in cooperation with the Jones and Laughlin Steel Corp., who had constructed a furnace and experimented with acid linings. The larger scale tests fully corroborated the laboratory findings, and it was determined that the properties of turbo-hearth steel are on a par with those of openhearth steels of similar composition.

Many problems of an operating, maintenance, and design nature remain to be solved before the turbo-hearth assumes its place among steelmaking processes, Dr. Marshall noted.

Talk on Transformations Clarifies Heat Treatment

Reported by Ben Dixon
Assistant Sales Manager
Dominion Wheel & Foundries Limited

Many points in regard to the heat treatment of steel were cleared up by Morris Cohen of Massachusetts Institute of Technology in an excellent lecture delivered before the Ontario Chapter A.S.M. on April 5.

Speaking on "Transformations in Steel" Dr. Cohen dealt with the austenite transformation in both a theoretical and practical fashion. Examples were cited for a variety of steels, ranging from the engineering steels to the high speed toolsteels.

Dr. Cohen gave a particularly lucid account of why it is necessary to double-draw high speed steels. He also left the audience with a better realization of the importance of retained austenite, particularly when this material transforms during the tempering operation.

President's Night at Los Angeles

At National President's Night of the Los Angeles Chapter A. S. M. on March 23 Are (Left to Right): Chapter Secretary W. J. Parsons, National Secretary W. H. Eisenman, President Arthur E. Focke, and Chapter Chairman J. B. Morey. President Focke spoke on "The Application of Metallurgical Principles to Products" and Secretary Eisenman presented his annual report on A. S. M. activities. (Reported by Benjamin Gray, Gray Engineering Co.)

Bronze Has Useful Attributes as an Engineering Material

Reported by Knox A. Powell

Research Engineer, Minneapolis-Moline Co.

The possibilities of "Bronze as an Engineering Material" were demonstrated before the Northwest Chapter A.S.M. on April 20 by Oscar Frohman, consulting engineer of Ampco Metal, Inc. Mr. Frohman prefaced his talk with the showing of the beautiful technicolor film entitled "Golden Horizons", illustrating the development of copper alloys from prehistoric times.

The silicon, manganese and aluminum alloys of copper are not true bronzes like the tin alloy, nor are they really brasses like the zinc alloy, Mr. Frohman pointed out. Alloys of copper, unlike alloys of iron, have no definite yield point. Also, the phase diagram of most copper-aluminum alloys shows that the physical structure cannot be modified by heat treatment, with the exception of a few alloys such as the 9.8 to 11.5% aluminum bronzes that can be hardened by heat treatment. The inherent physical characteristics facilitate casting, welding, and hot working, without fear of changing physical properties.

An important attribute of copper alloys, particularly the copper-aluminum alloys, said Mr. Frohman, is their favorable combination of dynamic and static properties, and their ability to cope with heat, that greatest enemy of bearings. A bearing bronze of 2% beryllium-copper alloy has a coefficient of heat transfer five times that of ordinary aluminum bronze and a hardness sometimes reaching Rockwell C-55.

Mr. Frohman pointed out that whereas the important steel alloying elements of chromium and manganese must be imported by the United States (and even iron itself is likely to be a deficit material soon), copper and the necessary nickel, aluminum, and iron for alloying are all available from domestic sources, even though copper is now imported for price reasons. Moreover, copper alloys are practically immune to rust which levies such a terrific toll on our steel resources.

Chairman Credits New Members to Officers' Night

Reported by P. H. Ditzler

Field Engineer, Leeds & Northrup Co.

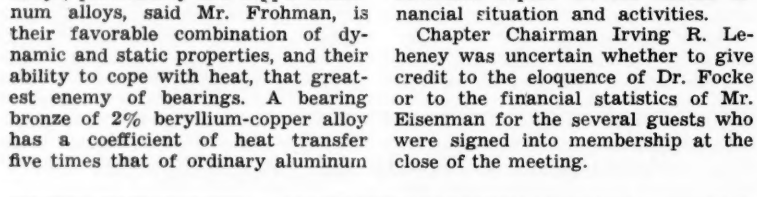
The March meeting of the Golden Gate Chapter A.S.M. was National Officers' Night, with President Arthur E. Focke and Secretary William H. Eisenman as the speakers.

Dr. Focke gave the technical talk on "Wear and Wear Testing"—one of six subjects which he is prepared to present. The lively and prolonged question period after the talk, and the further activated group around the president after the meeting had formally ended attested that the topic chosen had truly fitted the needs of the chapter members.

Preceding Dr. Focke's talk, Secretary Eisenman passed on several very usable anecdotes and made a most favorable report on the A.S.M. financial situation and activities.

Chapter Chairman Irving R. Leheney was uncertain whether to give credit to the eloquence of Dr. Focke or to the financial statistics of Mr. Eisenman for the several guests who were signed into membership at the close of the meeting.

Relates "Hardenability Story"



Relaxing During the March 14th Meeting of the Eastern New York Chapter A. S. M. Are (Left to Right): Warren F. Savage of Rensselaer Polytechnic Institute, Program Chairman; John M. Hodge, Research Associate of Carnegie-Illinois Steel Corp., the Speaker; and John H. Hollomon of General Electric Co. Mr. Hodge's talk, entitled "The Hardenability Story" was reported in the April issue of Metals Review, page 16. (Reported by Alexander Lesnewich, Rensselaer Polytechnic Institute)

Two Purdue Professors Give Program on Testing And Statistical Control

Reported by S. A. Minton, Jr.

Allison Division, G.M.C.

A coordinated program on metallurgical testing was presented at the April 17th meeting of the Indianapolis Chapter A.S.M. by two speakers associated with Purdue University. G. M. Enos spoke on "Limitations on Metallurgical Testing" and I. W. Burr on "Statistical Quality Control Applied to Metallurgical Testing".

Dr. Enos pointed out that there are 131 properties that can be determined with relative ease; not all of these tests can be made economically, however. Testing is necessitated by property variations which may be incurred either in the original manufacturing conditions and operations, or in subsequent processing of the metal. Test methods are either destructive or nondestructive in character and can be supplemented with actual service tests.

Limitations of testing may be economic (not as many tests as could be desired), or may be governed by specifications, or by ignorance of actual service conditions or history of the part. These limitations can be conquered; however, lack of fundamental knowledge which is not yet available also hampers metallurgical testing. Development of the high magnifications of electron microscopy was illustrated with photos of grain boundaries and pearlite at 30,000X. The story of grain boundaries is only one of the missing fundamental building blocks which limit metallurgical testing.

Dr. Burr, in his portion of the program, pointed out that varying measurements are statistical problems and should be handled as such. Frequency distribution graphs are the first step in statistical methods and can be quite informative in checking deliberate or accidental human errors and methods of sampling and testing. When control limits are set up for a process or acceptance test, the natural variation, which is uncontrollable, determines the distance between high and low limits. Points which plot outside these limits have assignable causes of variation and should be thoroughly investigated.

Excellent slides illustrated these methods and resulting graphs. These simple forms of control involve only simple arithmetic, Dr. Burr said.

B & L Acquires Chicago Firm

Bausch & Lomb Optical Co. of Rochester, N. Y., has announced the acquisition of the Riggs Optical Co. of Chicago, an affiliated distributor for many years. The Chicago firm will be known as the central division of Bausch & Lomb.

Bases Talk on Stainless Questions

Speakers' Table at the St. Louis Chapter Meeting Included (From Left): L. W. Morrell, Secretary-Treasurer of the Chapter; Louis Malpoker, Chairman; V. N. Krivobok, Speaker; and C. W. Messenger, Program Chairman

Reported by H. O. Nordquist
Manager, Alloy and Stainless Steel Dept.
Joseph T. Ryerson & Son, Inc.

The questions most frequently asked him on stainless steel problems formed the basis of a talk by V. N. Krivobok, who is in charge of the stainless steel section, development and research division, International Nickel Co., Inc. Dr. Krivobok spoke at the February meeting of the St. Louis Chapter A.S.M.

Dr. Krivobok first explained how chromium and nickel additions affect the structure and corrosion resistance of various stainless steels. Other factors besides analysis also affect corrosion resistance, such as aeration of the corrosive medium, temperature, surface preparation, contact corrosion, electric currents and stress-corrosion.

Rate of work hardening and its effect on the properties of austenitic steels formed the subject of an interesting study. Cold rolling 18-8 austenitic stainless steels at temperatures below zero increases the tensile strength, and also improves the ductility markedly. This was illustrated by figures for Type 302 stainless, rolled to half-hard temper. The material that was rolled at 70° F. (standard room-temperature practice) showed a tensile strength of 160,000 psi. with 16% elongation; if worked at −320° F. to the same percentage of reduction, the tensile strength was 190,000 psi., and elongation was 38%.

Data were also cited for Type 301 with a 40% reduction. Tensile strength of 162,000 psi. was secured by rolling at −105° F., 220,000 psi. at −320° F., and only 150,000 psi. at room temperature.

The practicability of cold reducing stainless steel at low temperatures was discussed, and several special processes were suggested by the speaker.

French Metallurgists To Convene in Paris

The Autumn 1950 Metallurgical Conference of the French Society of Metallurgy will be held in Paris Oct. 16 through 20. The conference this year will celebrate the centenary of the birth of Henry LeChatelier, famed French metallurgist.

Since Professor LeChatelier's interests covered the entire field of metallurgy, no specific theme has been assigned to this year's conference and papers will not be limited to any particular subject.

The conference is under the direction of H. Perreau, administrative secretary of the Societe Francaise de Metallurgie, and Prof. Georges Chaudron, president.

Atomic Energy Marks Significance of Decade

Reported by E. R. Freeman
Metallurgist, Kaiser Aluminum & Chemical Corp.

The discovery and development of new antibiotics (such as penicillin), television, nylon, jet propulsion, radar, synthetic rubber and plastics—these and the many other similar developments have made the decade just past an exciting one. But the development of atomic energy, by itself, would make the 1940's and 50's the most historically significant 20 years since the Birth of Christ, said Donald G. Sturges, speaking before the Inland Empire Chapter A.S.M. at the March meeting. Mr. Sturges is in charge of operations of the technical division at the Hanford Atomic Works. His subject was "The Role of Metallurgy in Atomic Energy".

The full realization of the peaceful benefits to be derived from this new source of energy will take years of coordinated endeavor from scientists, physicists, metallurgists and nations all working as a team, Mr. Sturges continued. Metallurgy stands near the top in contributing to the success of the first major objectives, and metallurgy must continue to make contributions if we are to realize fully all the potential benefits from this new power.

The production of uranium was not the only metallurgical problem associated with this project, although a substantial body of information on the fundamental metallurgy of uranium had to be developed in short order. Since the literature revealed virtually no information at all on uranium's metallurgical characteristics it was necessary to start from scratch.

Many other problems loomed into view such as materials to withstand high concentrations of radiation, and methods of protecting operating personnel, water resources, and widespread areas from being exposed to radiation. The metallurgists also were involved in developing fundamental metallurgical data about the completely new man-made element, plutonium.

In the years since the war, metallurgical studies have continued at a substantial level, and much effort has been devoted to expanding knowledge of the materials and refining the data collected during the war years.

Statistical Methods of Inspection Viewed As Psychological Tool

Reported by W. O. Manuel
AC Spark Plug Division, G.M.C.

A new view of statistical methods in inspection as primarily a psychological tool was presented before the Saginaw Valley Chapter A.S.M. on April 18 by H. A. Weissbrodt, works manager, and Richard D. Long, chief inspector, of the Fort Wayne Works, International Harvester Co. Their subject, "The Foreman's Responsibility in the Quality Control Program", was presented before a capacity audience of over 160, augmented by many inspectors from Saginaw Valley industries.

The use of statistical control charts at each operation in the Harvester Works has reestablished the interest of both inspectors and production workers in the quality of their products and has thereby contributed to a general improvement in human relations, Mr. Weissbrodt explained. "Quality control" is 85% psychological and 5% statistical, he said.

Gains in efficiency were illustrated by the Harvester forge shop, where the yield of good forgings increased 6% per pound of steel after quality control methods were adopted.

Quality control will work on any inspection operation where products are weighed, counted, measured, or evaluated, Mr. Long reported. It has even been used to improve efficiency and eliminate errors in office work.

Mr. Long pointed out that quality checks the product at the point of manufacture, while older methods merely sort the products after errors have already been made in processing. An inspector will make the wrong decision 86% of the time on the basis of the old 10% final inspection, and experiments have shown even 100% final inspection is only about 85% effective.

Declassified Data On Nuclear Reaction Effects Revealed

Reported by Melvin R. Meyerson
National Bureau of Standards

Highly informative data, declassified only recently, was presented before the Washington Chapter A.S.M. on April 10, when Douglas Billington of the Oak Ridge National Laboratory spoke on "Effects of Nuclear Reactor Products on Metals".

Dr. Billington described experiments in which several metals and alloys, including copper, Cu_3Au, Cu-Be, monel, silicon bronze and stainless steels were exposed to neutron bombardment from an atomic pile. The effects of this bombardment on some of the physical and mechanical properties of the metals were determined.

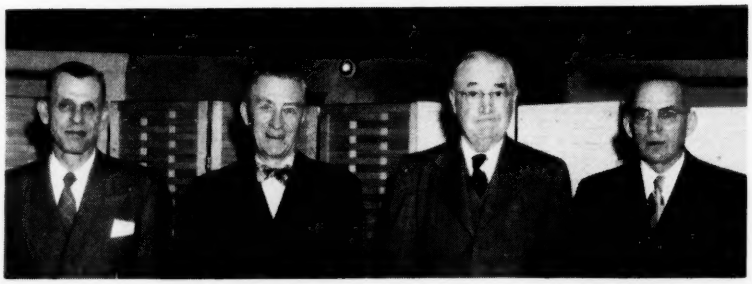
When the exposure was large enough, all metals showed an increase in hardness. In all instances, some neutrons were taken up by the metals and alloys to form isotopes which in turn disintegrated to different elements. However, except for the Cu_3Au alloy, this effect was so small that it was disregarded in the property determinations.

Electrical resistivity has been found to be a good indicator of the degree of disorder in Cu_3Au, and was used to determine any degree of disorder which might be caused by nuclear bombardment. In this experiment a thermally disordered specimen was found to have an electrical resistivity of 11.2×16^{-6} microhms, and an ordered specimen 4.5×10^{-6} microhms. Both were subjected to neutron bombardment and the resistance of the ordered specimen gradually increased until a resistivity of 11.2×10^{-6} was approached. The resistance of the thermally disordered specimen increased very slightly, but this was attributed to the formation of mercury.

The speaker also described electrical resistivity and hardness effects in Cu-Be in various stages of heat treatment and cold work. Practically no radiation effects on these two properties were noted in a 50% cold worked material; a large hardness and resistivity increase was measured for the as-quenched, supersaturated alpha solid solution; and small but definite increases were noted in both properties for the heat treated material. In no cases could the hardening be attributed to precipitation hardening.

The reactor-induced hardness and resistance changes in Cu-Be were annealed out by 20 to 30-sec. heat treatments at 300° C. Similar samples not exposed to radiation were hardly affected by the same heat treatment.

Speaks on Welding Metallurgy



S. L. Hoyt (Second From Left) Spoke on "The Metallurgy of Welding" Before a Joint Meeting on April 4 of the Birmingham, Ala., Chapters of A. S. M., the American Welding Society, and the American Institute of Mining and Metallurgical Engineers. Left to right are J. T. Vann, chairman of A. W. S., Dr. Hoyt, W. C. Chase, chairman of A. I. M. E, and H. A. Caldwell, chairman of A. S. M. (Reported by Sam F. Carter, American Cast Iron Pipe Co.)

Cobalt Alloys Illustrated By Stellite and Vitallium

Reported by George F. Kappelt
Metallurgist, Bell Aircraft Corp.

What makes stellite suitable for high-temperature, high-strength application? What makes Vitallium the most useful material for the medical profession? These two basic questions were answered by W. A. Wissler, Union Carbon and Carbide Research Laboratories, at the April meeting of the Buffalo Chapter A.S.M. This meeting was the first in eight years held at Niagara Falls.

Mr. Wissler traced the development of cobalt-base alloys from their inception. A straight cobalt-chromium alloy is unsatisfactory because it does not possess sufficient strength, he said. However, when tungsten, molybdenum, carbon, or nickel—or combinations of these—are added, the alloys produced have the desirable strength and corrosion resistance characteristics that are needed.

The stellite type of alloys fall into three general categories—soft, medium and hard. The hardness is approximately proportional to the carbon content (the hard variety having 2.40% C) and is inversely proportional to the nickel content.

The principal reason why Vitallium is the most satisfactory alloy for medical applications is that it is inert to body fluids. All types of repair items, such as nails, screws, and plates, that are used to replace bone structure in the body are now made from Vitallium. Medical reports also indicate that Vitallium has a peculiar characteristic in that the bone structure tends to grow around the metal. When other materials are used, the bone structure tends to shrink or rot away from the alloy.

Course in Quality Control

An intensive ten-day course in quality control by statistical methods will be offered on the University of Colorado campus August 14 through 25. The course is open to production and management personnel throughout the country. It will be limited to 60 participants, who may live in university housing; for those who bring families, regular vacation accommodations are available.

Charge for the course is $100, including instruction and all texts and materials. Further information can be secured from Dean C. L. Eckel, University of Colorado, Boulder, Colo.

Shows How Tracers Solve Problems in Metallurgy

Reported by Howard E. Boyer
Chief Metallurgist, American Bosch Corp.

"Radioactive Tracers—Their Uses in Metallurgical Processes," was the subject of the March meeting of the Springfield Chapter A.S.M., the lecture being presented by C. E. Birchenall, member of the staff at Carnegie Institute of Technology.

Radioactive materials are available for research, development and control applications, provided the purchaser has the knowledge and equipment necessary for using activity safely, Dr. Birchenall said. He explained how to obtain and handle such materials, and mentioned some specific instances where radioactive materials and devices for detecting them have been used to advantage in metallurgical work. A well-known example is in the determination of the height of molten metal in a cupola.

Fundamental research applications include measurements of self-diffusion coefficients in pure metals and the determination of rates of transfer across slag-metal interfaces in steelmaking reactions.

Panel Meeting Held On Powder Metals For Structural Parts

Reported by Jerome F. Kuzmick
Ekstrand & Tholand, Inc.

A recent audience participation panel meeting on "Powder Metallurgy as Applied to Structural Parts", sponsored by the New York Chapter A.S.M. was conducted by F. V. Lenel of Rensselaer Polytechnic Institute, serving as chairman. The panel was composed of four men—T. L. Robinson of the Wel-Met Co. and J. F. Kuzmick of Ekstrand & Tholand representing producers, and W. A. Reich of General Electric Co. and D. M. Abbott of Remington Arms Co. representing consumers.

Mr. Kuzmick gave a brief history of the development of structural parts from iron powder from the middle 1930's to the present time. The tonnage of iron powder going into structural parts, he said, has increased since the end of World War II from 100 or 150 tons per month to about 500 or 600 tons; current expansion is approximately at the rate of 30% annually.

Strength of structural parts has also increased two to three times in the last ten years, as a result of improved powders and new techniques. As examples of the latter he cited the development of dense parts by double pressing and by infiltration of porous iron parts with copper.

There are two schools of thought on structural powder parts, the speaker pointed out. One school believes it best to produce porous low-strength parts to replace cast iron and similar materials, while the other school believes that the greatest field of application for powder metal parts lies in the development of high-strength, high-density products.

Mr. Robinson wittily described the woes of the manufacturer in going through the development of a structural part. Much time and energy may be spent in making up test pieces and test dies and doing a lot of missionary work, only to find in many instances that the parts user suddenly switches to another design, or so changes it that the development work has to be started all over again. Much more could be done with metal powder parts if the units in which they were to be used were designed originally with powder metal moldings in mind, he felt. Mr. Robinson stated that he belongs to the "cast iron" school of thought, and if he could replace 10% of the cast iron business with powder iron parts he would be very happy.

Mr. Reich discussed some of the experiences of General Electric Co. in developing applications for structural parts. Washing machine gears, he stated, are being purchased by G. E. at considerable savings over cut gears. Tests simulating service are used for quality control and acceptance purposes, and satisfactory performance has resulted. Much work is being done on specifications and methods of test for structural parts, and more effort can be profitably expended in this field.

Mr. Abbott told of the development of powder metal parts for gun mechanisms, and mentioned the difficulties with dimensions when substituting powder parts for solid metal. Brazing also presents a problem because of absorption of the brazing material in the pores of the metal.

Since the powder metal parts should have a certain amount of ductility and should be free of burrs, he believes that better inspection methods must be developed. Improvement in control methods should lead to many additional applications.

The audience discussion was lively, and most of it concerned quality control methods and specifications. Emphasis was placed on the fact that powder parts may vary in density from one section to another, and for this reason test bar results cannot be accepted as a standard to evaluate the mechanical properties of the part itself. The possibility of training design engineers among the consuming industries so that they can properly design parts for metal powder molding was also discussed.

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A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by Pauline Curry, N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue

A GENERAL METALLURGICAL

141-A. Operating Economies Aid Steel Earnings. *Steel,* v. 126, Apr. 24, 1950, insert between p. 52 and 53.

25th Annual Financial Analysis of the Steel Industry presents tabular data for 29 leading companies representing slightly more than 92% of U. S. ingot capacity. (A4, ST)

142-A. 1948-49 Marked by 62% Expansion of Chemical Research at Armour Foundation. *Chemical and Engineering News,* v. 28, Apr. 24, 1950, p. 1367-1371.

Outlines research projects in a variety of fields. (A9)

143-A. UC's Growing Metallurgical Research Serves Industry *Western Metals,* v 8, Apr. 1950, p. 31-32.

Research at University of California. (A9)

144-A. Economic Considerations in Producing Magnesium-Containing Iron. Donald J. Reese. *Foundry,* v. 78, May 1950, p. 120-125.

Production costs, applicable raw materials, and specifications for ductile or nodular cast iron. Typical applications. (A4, S22, CI)

145-A. Zinc Industry Facing Critical Condition Due to Insufficiency of Concentrates. Howard I. Young. *Metals,* v. 20, Apr. 1950, p. 6-7, 12.

Survey of supply situation. (A4, Zn)

146-A. Impact of Devaluation on Nonferrous Metals. Simon Strauss. *Metals,* v. 20, Apr. 1950, p. 13, 15-16. (A4, SG-a)

147-A. U. S. Supplies of Strategic Manganese Show Upward Trend in 1949. Louis A. Cassara. *Foreign Commerce Weekly,* v. 39, May 1, 1950, p. 6-7, 39-40.

Economic survey shows loss of U.S.S.R. source to be offset by gains in other areas. (A4, B10, Mn)

148-A. Commentary: Scientific Research in Industry. P. Chevenard. *Research,* v. 3, Apr. 1950, p. 149-153.

French scientist discusses fundamental and applied research, indicating value of industrial research in which the researchers are allowed considerable freedom to explore seemingly unprofitable bypaths. Illustrates value of such investigations by the story of the development of an alloy resistant to corrosion cracking in steam at elevated temperatures. (A9)

149-A. Rank of L.S. Iron Ore Producers in 1949. *Skillings' Mining Review,* v. 39, Apr. 22, 1950, p. 1-2.

Tabulates shipments from individual mines of 26 Lake Superior operating companies. (A4, Fe)

150-A. Whither Metallurgy? James White. *Refractories Journal,* v. 26, Mar. 1950, p. 75-82.

Present status and future prospects in the application of theoretical physics to metallurgy. (A9)

151-A. 1949 Output of Lead and Zinc in Arizona Made New State Record. *Skillings' Mining Review,* v. 39, Apr. 29, 1950, p. 1.

Statistics. (A4, Pb, Zn)

152-A. The Calbeck Process for Refining Zinc Oxide. John H. Calbeck, William T. Maidens, and Oscar J. Hassel. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 757-763.

Rotary gas-fired reheating furnace used by American Zinc Oxide Co. at Columbus, Ohio for refining lead-free zinc oxide. Outstanding features are that the color of the ZnO is greatly improved, S is eliminated, and Cd is recovered without densifying the product to an objectionable degree. (A8, C21, Cd)

153-A. Treatment of Electrolytic Copper Refinery Slimes. J. H. Schloen and E. M. Elkin. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 764-777.

Known methods for treatment of anode mud or slimes, for recovery of precious metals and other by-products. The processes used by five copper refineries and their flowsheets. The slimes contain varying quantities of Cu, Ag, Au, S, Se, Te, Pb, As, Sb, Ni, Fe, SiO_2. Products recovered are Se, Te, Au, Ag, Pt-group metals, and sometimes Pb. 50 ref. (A8, C28, Cu, Se, Te, Ag, Au, EG-c)

154-A. Modern Baghouse Practice for the Recovery of Metallurgical Fumes. A. L. Labbe and J. J. Donoso. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 792-796.

Principles governing bag filtration and factors most directly affecting bag life. Methods for temperature conditioning of smoke previous to filtering, and the evolution of bag-shaking mechanisms. Application is mainly to the lead smelter and nonferrous blast furnace. Miscellaneous oxides are recovered. (A8, C21, Pb)

155-A. Europe Will Need Metals From Western Hemisphere. R. L. Wilcox. *Engineering and Mining Journal,* v. 151, May 1950, p. 88-90.

Economic survey and prediction of future European needs for imported nonferrous metals, a vital factor in future prices. (A4, EG-a)

156-A. Auto Industry Takes More Steel. *Steel,* v. 126, May 15, 1950, p. 60-61.

Tables and graphs show tonnage amounts and percentage distributions of steel in 1949 among various principal products. Includes distributions for alloy and stainless steels. (A4, T21, ST)

157-A. The Electrification of Metal Dusts. A. R. Boyle and F. J. Llewellyn. *Journal of the Society of Chemical Industry,* v. 69, Feb. 1950, p. 45-49.

Static electrification of a number of metal dusts was measured in two standard experiments; these results, together with the electrostatic energy required for the ignition of dust clouds of metal powders, provide a basis for estimation of the electrostatic hazard likely to be encountered in handling quantities of such materials. (A7)

158-A. Safety Procedures for Protection Against Flammable Atmosphere Hazards of Special Atmosphere Furnaces: I. J. B. Smith. *Industrial Heating,* v. 17, Apr. 1950, p. 592-596, 598, 600, 743.

Detailed procedures, including flammability-limit graphs, and diagrams showing layout and circuits of control systems. (To be continued.) (A7, J2)

159-A. National Supply Spends $25 Million for New Equipment. *Iron Age,* v. 165, May 11, 1950, p. 70-71.

Includes furnaces, pipe straighteners, heat treating, hot milling, machining, and testing equipment, used in manufacture of pipe and tubular products and oil-field equipment. (A5, ST)

160-A. A Process for the Recovery of Gold From Activated Carbon by Leaching and Electrolysis. J. B. Zadra. *U. S. Bureau of Mines,* Report of Investigations 4672, Apr. 1950, 47 pages.

Describes process for extracting Au from Au-laden carbon and reuse of the de-adsorbed carbon. Process consists of leaching with a caustic sodium sulfide solution and recovering the Au by electrolysis. 46 ref. (A8, Au)

161-A. 30th Annual Report, 1950, 61 pages. *British Non-Ferrous Metals Research Association,* Euston St., London, N.W. 1, England.

Presents a general report. Reviews research in 1949-50 on Cu, Ni, Al, Mg, Pb, Sn, their alloys, Zn, and galvanizing. Includes photographs of metallurgical laboratories and lists of reports and translations. (A9, EG-a)

162-A. (Book) **Manufacturing Analysis.** Richard F. Kipers. 452 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, $5.00.

Describes major manufacturing processes of metalworking, explaining their basic principles, their fundamental tooling, their production capabilities and limitations, and the problem of estimating production on each. Chapters on forgings, die casting, plastic molding, welding, press work, sawing, planing, and shaping, milling, broaching, turning, grinding, thread-forming, surface finish, inspection, materials handling, assembling, tooling costs, analysis of operations, and tolerance balancing. (A5)

163-A. (Book) **Métallurgie.** (Metallurgy). Ed. 63. R. Cazaud. 349 pages. 1949. Dunod, 92 rue Bonaparte, Paris 6, France.

A brief handbook giving condensed information concerning all phases of theoretical and applied metallurgy. (A general)

B

RAW MATERIALS AND ORE PREPARATION

145-B. Furnacemen Stress Importance of Ore Beneficiation Practices. *Steel*, v. 126, Apr. 24, 1950, p. 94, 96.

Summarizes proceedings of annual conference of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven and Raw Materials Committee of AIME, Cincinnati, Apr. 10-12. Includes iron-ore reserves and beneficiation, blast-furnace and openhearth practice. (B10, D1, D2, Fe)

146-B. Theory of Water-Repellent Films on Solids Formed by Adsorption From Aqueous Solutions of Heteropolar Compounds. Melvin A. Cook and John C. Nixon. *Journal of Physical & Colloid Chemistry*, v. 54, Apr. 1950, p. 445-459.

The most important industrial use of this theory is separation of minerals by flotation. 26 ref. (B14)

147-B. Columbium—New Uses and Limited Supply. John Anthony. *Iron Age*, v. 165, Apr. 27, 1950, p. 101-102.

A survey. (B10, T general, Cb)

148-B. Quality of Silica Brick. H. M. Kraner. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 211.

General discussion; roof performance. (B19, D2)

149-B. Relative Effect of Alkalis and Alumina on Refractoriness of Silica Brick. L. L. Wells, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 212-217; discussion, p. 217.

(B19)

150-B. Gold Concentration at the Amalgamated Banket Areas Reduction Plant. G. Chad Norris. *Journal of the Chemical Metallurgical & Mining Society of South Africa*, v. 50, Jan. 1950, p. 152-162; discussion, p. 163-167.

Mechanical methods which have been introduced in place of straking for recovery of free gold. Includes flow and equipment diagrams, and tables. (B14, Au)

151-B. Economic Considerations With Respect to the Sintering of Iron Ore. (In German.) Walter Luyken. *Archiv fur das Eisenhuttenwesen*, v. 21, Jan.-Feb. 1950, p. 1-8.

Detailed cost analysis on the basis of published data. 15 ref. (B16, A4, Fe)

152-B. Mathematical-Physical Relationships in the Sintering of Iron Ore. (In German.) Michael Hansen. *Archiv fur das Eisenhuttenwesen*, v. 21, Jan.-Feb. 1950, p. 9-12.

Effects of various factors such as applied pressure and pressure drop, depth of charge, rate of sintering, etc., on rate of production by the ladle and the moving-belt process. (B16, Fe)

153-B. Slags Containing Silicon Monoxide. (In Russian.) P. V. Gel'd and O. A. Esin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 21, 1950, p. 473-475.

Proves, by theoretical considerations and by experiments, the presence in ferrous metallurgical slags of SiO as an unstable intermediate phase. (B21, Fe)

154-B. Behavior of Refractory Oxides and Metals, Alone and in Combination, in Vacuo at High Temperatures. P. D. Johnson. *Journal of the American Ceramic Society*, v. 33, May 1, 1950, p. 168-171.

See abstract of "Refractory Reactions in Vacuum" (a condensed version), *Industrial Heating*, item 5B, 1950. (B19, Mo, W, SG-h)

155-B. A New Approach to Taconite Utilization. John J. Howard. *Mining Engineering*, v. 187, May 1950, p. 560-563.

See abstract from *Iron Age*, item 2B-125, 1949. (B16, B17, Fe)

156-B. Oxidized Lead Ore Recovered Profitably. E. V. Given. *Mining Engineering*, v. 187, May 1950, p. 570.

Size-reduction and beneficiation procedures of St. Anthony Mining & Development Co., Tiger, Ariz. Au, Ag, Cu, Pb, and Zn are recovered. (B14, Au, Ag, Cu, Pb, Zn)

157-B. The Burt Filter. W. G. Woolf and A. Y. Bethune. *Mining Engineering*, v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 187, 1950, p. 585-590.

Filtration of hct (60° C.) supersaturated zinc sulfate solution (sp. gr. 1.540) from slimy leach residues at the electrolytic zinc plant of Sullivan Mining Co., Kellogg, Idaho, using modified Burt filters to meet conditions of the high-acid, high-density process for electrolytic zinc. (B14, Zn)

158-B. Effect of $BaCl_2$ and Other Activators on Soap Flotation of Quartz. R. Schuhmann, Jr., and Brahm Prakash. *Mining Engineering*, v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 187, 1950, p. 591-600.

Chemical conditions for flotation and nonflotation of quartz with oleic acid as collector and Ba, Ca, Al, Fe, and Sn as activators were studied using a simple vacuum-flotation technique. Study of barium activation led to an interpretation based on Langmuir's chemisorption theory. 11 ref. (B14)

159-B. Effects of Activators and Alizarin Dyes on Soap Flotation of Cassiterite and Fluorite. R. Schuhmann, Jr., and Brahm Prakash. *Mining Engineering*, v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 187, 1950, p. 601-608.

Chemical conditions for flotation and nonflotation of cassiterite and fluorite with oleic acid as collector and with alizarin dyes as modifying agents were studied by means of small-scale, vacuum-flotation tests. Artificial cassiterite was prepared by high-temperature methods. 12 ref. (B14, Sn)

160-B. Unique Bucketline Dredge Recovers Placer Scheelite. W. A. Noon. *Engineering and Mining Journal*, v. 151, May 1950, p. 82-84.

Flow diagrams for operation of H. & H. Mines, Inc., Drummond, Mont., which recovers tungsten concentrate as well as gold. Also recovered is a high-purity magnetite concentrate suitable for heavy medium in a sink-and-float plant. (B14, Au, W)

161-B. Manufacture of Nodules From Fine Ore and Limestone at Buffalo, N. Y. A. A. Oesterle. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 8, 1949, p. 132-136; discussion, p. 136-138, 144-145.

A steel company requested the Federal Portland Cement Co. to nodulize approximately 25,000 tons of the byproduct from a chemical company. Layout of plant and the change-over from cement manufacture to nodulizing pyrite. (B16, A8, Fe)

162-B. Manufacture of Nodules at Ironton, Ohio, Using Mesabi Fines and Blast-Furnace Flue Dust. E. F. Brownstead. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 8, 1949, p. 139-142; discussion, p. 142-145.

Preliminary tests to determine the proper percentages of blast-furnace flue dust, iron ore, and lime flux. Charging of kiln, operation of 8-ft. kilns, and testing of nodules in the openhearth. (B16, Fe)

163-B. Operation and Practice, Producing Iron Sinter at Ducktown and Copperhill, Tennessee, With Fine Flotation Sulphides. R. R. Burns. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 8, 1949, p. 146-150; discussion, p. 150-157.

Plants layouts, practices, and results. (B16, Fe)

164-B. Briquetting Fine Ores at Woodward, Alabama. H. A. Byrns. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 8, 1949, p. 158-164; discussion, p. 165-170.

Practice at Woodward Iron Co. in beneficiation of raw material that would cause considerable difficulty if charged to the blast furnaces as mined. (B17, Fe)

165-B. Consolidated Mining and Smelting Company of Canada, Limited. Con Milling Operation, Yellowknife, N. W. T., Canada. R. H. Ross. *Deco Trefoil*, v. 14, Mar.-Apr. 1950, p. 7-22.

Details of mining, milling, and concentration equipment and procedures of above mill for production of gold. (B12, B13, B14, Au)

166-B. Formation of Radioactive Surface Films on Minerals. T. G. Church. *Canadian Journal of Research*, v. 28, sec. A, Mar. 1950, p. 164-167.

Experiments which show that mineral surfaces can be made radioactive by undergoing exchange reactions with radioactive ions in solution. Such radioactive coatings may serve as a means of differentiating between minerals in an ore, and enable them to be separated by a suitable mechanical ore-sorting device actuated by a Geiger counter. (B14, P13)

167-B. Heavy-Media Separation at Algoma Ore Properties. George F.

Crocker. *Canadian Mining and Metallurgical Bulletin*, v. 43, Apr. 1950, p. 203-211; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 53, p. 143-151.

Preparation of iron-ore sinter, which is shipped to U. S. and Canadian blast furnaces, at Algoma mill on the north shore of Lake Superior. Equipment dimensions and characteristics, time requirements of the different units, costs, tonnage outputs, metallurgical characteristics. (B14, Fe)

168-B. Recent Improvements at the Sullivan Operations of the Consolidated Mining and Smelting Company of Canada, Limited. E. M. Stiles, E. H. Nagle, and G. J. Knighton. *Canadian Mining and Metallurgical Bulletin*, v. 43, Apr. 1950, p. 212-225; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 53, p. 152-165.

Improved mining, haulage, crushing, and concentration procedures. Includes 12,000-ton-per-day sink-float plant. Pb and Zn concentrates are recovered. (B12, B13, B14, Pb, Zn)

169-B. Concentration of a Lead-Silver Ore From Yerranderie, N.S.W. K. L. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne Metallurgical Laboratory* (Joint Investigation). Ore-Dressing Investigation No. 362, July 1949, 17 pages.

Mineralogical examination of head sample, table concentration, and flotation. Data are tabulated and discussed. (B14, Pb, Ag)

170-B. Concentration of a Lead-Silver Ore From a Mine at Mt. Barker, Eungella Mining Field, Q'ld. K. L. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne Metallurgical Laboratory* (Joint Investigation). Ore-Dressing Investigation No. 366, June 1949, 10 pages.

Mineralogical examination of head samples, table concentration, and flotation. (B14, Pb, Ag)

171-B. Investigation of a Method of Treatment of an Ore From the Sunshine Reward Amalgamated Near Southern Cross, W. A. Evan E. Hughes and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and the Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory, Mines Department of W. A.* (Joint Investigations). Ore-Dressing Report 367, May 1949, 8 pages.

An investigation comparing extractions of Au obtainable by agitation, cyanidation, and percolation cyanidation. (B14, Au)

172-B. Report on Treatment of Selected Ore From the Mountain View Gold Mines, Cue, W. A. Evan E. Hughes, R. W. Wilson, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and the Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory, Mines Department of W. A.* (Joint Investigations). Ore-Dressing Report No. 377, Apr. 1949, 6 pages.

Ore sample, roasting, amalgamation, and cyanidation. (B15, C24, C29, Au)

173-B. The Ionic Lattice Energies of Slag Components. (In Japanese.) Matsushita Yukio and Mori Kazumi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 14-16.

Above was calculated for several slag components by two methods. Scratch hardness of $MnO \cdot SiO_2$ and $(MnO)_2 \cdot SiO_2$ were measured and found to be related to lattice energies. (B21, P12)

174-B. Investigation of Oriskany Iron-Ore Deposits Alleghany, Bath, Botetourt, and Craig Counties, Va. G. A. Morrison and W. A. Grosh. *U. S. Bureau of Mines*, Report of Investigations 4668, Apr. 1950, 59 pages.

Screen analyses and log-washing, flotation, roasting, and magnetic separation tests. (B10, B14, Fe)

175-B. Flotation and Cyanidation Tests on a Gold-Copper Sulfide Ore From Cooke, Mont. A. L. Engel and H. J. Heinen. *U. S. Bureau of Mines*, Report of Investigations 4670, Apr. 1950, 9 pages.

Two methods of treatment were developed, giving good recovery of Cu, Au, and Ag with comparatively low consumption of cyanide. (B14, Ag, Au, Cu)

176-B. Investigation of Shawangunk Mine Zinc-Lead Deposit, Near Summitville, Sullivan County, N. Y. N. A. Eilertsen. *U. S. Bureau of Mines*, Report of Investigations 4675, Apr. 1950, 41 pages.

Includes tabulated results of preliminary beneficiation tests. (B10, B14, Zn, Pb)

177-B. Investigation of Nevada Scheelite, Inc., Deposit Mineral County, Nev. Robert W. Geehan and Russell R. Trengove. *U. S. Bureau of Mines.* Report of Investigations 4681, Apr. 1950, 13 pages.

Use of gravity concentration followed by cleaning on magnetic separators for beneficiation. (B14, W)

178-B. Charleson Jig Plant Converts Lean Ore to Iron Concentrate. *Mining World*, v. 12, May 1950, p. 32-34.

Unusual equipment and procedure of Charleson Iron Mining Co., near Virginia, Minn. (B14, Fe)

179-B. The Role of Lime and Finely Dispersed Fractions During Flotation of Several Sulfide Minerals. (In Russian.) I. N. Plaksin and A. M. Okolovich. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 365-366.

Method of separation by flotation of pyrite and arsenopyrite based on the different mechanisms of depressing action of lime on these minerals. The mixture can be separated by flotation in a lime solution after preliminary activation by $CuSO_4$, using standard frothers and collectors. (B14)

180-B. (Book) **Iron Bearing Deposits in Washington, Oregon and Idaho.** Carl Zapffe. 394 pages. Raw Materials Survey, 701 Woodlark Bldg., Portland 5, Ore. $2.50.

One of a series of reports. A comprehensive review of the quantities and types of ores found in the Pacific Northwest, from the standpoint of their suitability for establishment of large-scale steelmaking and fabricating industries in that region. (B10, Fe)

C
NONFERROUS EXTRACTION AND REFINING

59-C. Production of Titanium. *Light Metal Age*, v. 8, Feb. 1950, p. 16-18, 30-31; Apr. 1950, p. 17-20. Condensed from "Production of Ductile Titanium at Boulder City, Nev.", F. S. Wartman, J. P. Walker, H. C. Fuller, M. A. Cook, and E. L. Anderson.

Previously abstracted from *U. S. Bureau of Mines*, Report of Investigations 4519, Aug. 1949. See item 2C-78, 1949. (C26, Ti)

60-C. The Reduction of Ferrous Oxides in the Slags of Nonferrous Blast Furnaces. (In German.) Ernst Justus Kohlmeyer and Karl Heinz Mahlich. *Zeitschrift fur Erzbergbau und Metallhuttenwesen*, v. 3, Feb. 1950, p. 34-40.

Three series of experiments show that the reduction of ferrous oxide in molten Fe-Ca silicates decreases with increasing percentage of silica. The presence of sulfur has the same effect; while As, combining with Fe to form iron arsenide, has the same effect as carbon. As_2O_3 did not affect the reduction process. Data cover oxides and sulfides of Fe, Cu, Pb, Zn, Sn, and Sb. Applicability to Pb and Cu blast-furnace practice is emphasized. (C21, Pb, Cu)

61-C. A Study of Arc-Melted Molybdenum-Rich Chromium-Molybdenum Alloys. H. D. Kessler and M. Hansen. *Transactions of American Society for Metals*, v. 42, 1950, p. 1008-1030; discussion, p. 1030-1032.

Previously abstracted from Preprint. See item 14C-77, 1949. (C21, M26, R2, Mo)

62-C. Mercurial Metallurgy. *Industrial and Engineering Chemistry*, v. 42, May 1950, p. 20A. Based on "Mercury in Chemical Metallurgy", H. Hohn.

Previously abstracted from *Research*. See item 11-C, 1950. (C29)

63-C. The Nitrogen Chloride Refining of "NE", Especially Applicable to Light Metals. (In German.) W. Dautzenberg. *Metall*, v. 4, Apr. 1950, p. 125-129.

A method of refining scrap aluminum and other light-metal alloys by removing their nonmetallic and gaseous impurities, Mg and Zn. Diagrams and a photograph illustrate the scrap converters. (C21, A8, Al, Mg)

D
FERROUS REDUCTION AND REFINING

93-D. Refractory Practice in Acid Electric Steel Melting. R. H. Jacoby and M. Petty. *American Foundryman*, v. 17, Apr. 1950, p. 117-121.

Established practices in electric-furnace shell lining and roof construction, ladle lining, and refractory repair and storage. (D5, ST)

94-D. The Bessemer Converter Process in the Manufacture of Steel. A. B. Wilder. *Industrial Heating*, v. 17, Apr. 1950, p. 634, 636, 638, 640, 642, 644.

See abstract under similar title from *Journal of Metals* (Technical Section), items 2B-339, 1949. (D3, ST)

95-D. Acid Open Hearth Furnace Operations. *Industrial Heating*, v. 17, Apr. 1950, p. 646, 648, 650, 652.

Summarizes 5 papers presented at the Acid Open Hearth Operations Session of 32nd annual conference of the National Open Hearth Steel Committee of the AIME in Chicago. (D2, ST)

96-D. Openhearth and Blast Furnace Operators Report Latest Developments. *Iron Age*, v. 165, Apr. 27, 1950, p. 84-87.

Summarizes proceedings of 33rd joint conference of the National Open Hearth Steel Committee and

the Blast Furnace, Coke Oven, and Raw Material Committee, AIME, Cincinnati, Apr. 10-13. Oxygen-jet-fired openhearths, new mold coatings, furnace practice, utilization of low-grade ore, and coke-oven maintenance were featured. (D1, D2, Fe, ST)

97-D. Graphited Steel Ladle Stopper and Nozzle Refractories. *Ceramic Age*, v. 55, Apr. 1950, p. 260-261. Translated and condensed from "The Behavior of Graphite and Carbon in Refractory Materials," by F. Harders and H. Grewe.

Previously abstracted from *Stahl und Eisen*. See item 17-84, 1949. (D9, B19, ST)

98-D. Scrap Charging: Key to Increased Open-Hearth Production. R. Russell Fayles. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 24-34.

Quality of foreign and home scrap, size of charging boxes, and scrapyard facilities. (D2, A8, ST)

99-D. Effect of High Coke-Oven Gas Firing on Open-Hearth Operation. Fred G. Jaicks. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 35-41.

Previously abstracted from *Blast Furnace and Steel Plant*. See item 16B-78, 1949. (D2, ST)

100-D. Desulphurization of Pig Iron. H. M. Griffith. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 43-45; discussion, p. 43, 46.

Procedure used by the Steel Co. of Canada. (D2, CI)

101-D. Desulphurizing Cupola-Melted Hot Metal by Ladle Treatment With Alkalis. E. P. Best. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 46-53; discussion, p. 53-55.

Previously abstracted from "Desulphurizing for the Bessemer Process", *Blast Furnace and Steel Plant*. See item 63-D, 1950. (D3, D8, Fe)

102-D. Sulphur in Basic Iron and Steel. H. E. Warren, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 55-61; discussion, p. 61-65.

Previously abstracted from *Journal of Metals*. See item 2B-229, 1949. (D1, D2, ST)

103-D. Effect of Charging Variables and Additions on Sulphur Elimination. A. H. Osborne, *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 66-70.

Study made at Armco on a single furnace during the period of one campaign from roof to roof, to determine variables that effect quantity of S in the furnace and efficiency of removal during the refining period. Data were collected on 130 heats covering details of charge, delays, analysis, and furnace operation. (D2, ST))

104-D. Use of Manganese Ore for Sulphur Removal. W. H. Carpenter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 71-72.

Study made at the Pueblo plant of the Colorado Fuel and Iron Corp. (D2, ST)

105-D. Sulphur Balance in Open-Hearth Heats. Philip Schane, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 72-74; discussion, p. 74.

Contribution of S from various materials used at three plants of Carnegie-Illinois Steel Corp. D2, ST)

106-D. Reports by Sections on Use of Oxygen and Compressed Air. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 75-85; discussion, p. 85-87.

Reports from Eastern Section (J. S. Marsh); Southwestern Section (E. H. Reyer); Chicago Section (G. C. Lawton); Northern Ohio Section (T. A. Cleary); Southern Ohio Section (Robert S. Bower); Pittsburgh District (A. W. Thornton); and Western Section (George B. McMeans.) (D2, B22, ST)

107-D. Factors Affecting Open-Hearth Production in a Gas-Fired Furnace. S. F. Elam. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 87-92; discussion, p. 102-103.

Charging variables, slag control, time variables, working heats, and fuel rate. Data from Ashland and Middletown shops of Armco Steel Corp. are compared. (D2, ST)

108-D. Evaluation of Factors Influencing Open-Hearth Furnace Production in Oil-Fired Furnaces. A. P. Woods. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 93-101; discussion, p. 102-103.

Charging variables, flush, time variables, working the heat, and fuel rate. (D2, ST)

109-D. Sampling of Oxygen in Waste Gases. G. C. Primm. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 104-106.

Data obtained from questionnaire. Frequency and accuracy of sampling and equipment and procedure used. Relation of volume of air metered to that required. (D2, S11)

110-D. What Is Being Done To Improve Scrap Quality and Better Prepare It for Charging? H. A. Parker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 107-109.

Survey based upon answers to questionnaires from 51 openhearth shops in 39 plants. 36 charged hot metal; 13, cold iron; and 2, blown metal. (D2, A8, ST)

111-D. Use of Blown Metal in Stationary Furnaces. S. J. Dougherty. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 110-115.

Procedure used by Weirton Steel Co. An increase in production of over 40% is realized by substituting partially blown metal for part of scrap and hot metal. (D7, ST)

112-D. Use of Blown Metal in Tilting Open-Hearth Furnaces. S. J. Creswell. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 116-120.

Dry-bottom practice. The charge is limestone. 270 000 lb. blown metal, and 40,000 hot metal. Working the heat; the slag; advantages and disadvantages of process. (D7, ST)

113-D. A Progress Report on Hot-Top Research. J. W. Mueller. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 120-126.

Hot top made of clay and various combustible materials is porous, insulating, and light in weight. Use of 10% volume hot tops on ingots up to 18½ sq. in., compared with 21% volume tops normally used. (D9, ST)

114-D. Recent Developments in Hot-Top Designs; Relative Efficiencies. E. W. Pierce. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 127-129.

Use of insulated clay, restricted C & D, experimental clay, and cement hot tops, on the basis of experience at South Works of Carnegie-Illinois Steel Corp. (D9, ST)

115-D. Scrap Preparation and Charging Practice. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 130-142.

Consists of the following papers: "Scrap Preparation and Charging Practice: Keystone Practice", William Schwinn (p. 130-134; discussion, p. 134-135); "Preparation and Charging Scrap at Sheffield Steel Corporation", W. H. Steinheider (p. 135-136; discussion, p. 136); "Scrap Preparation and Charging Practice at Granite City", R. C. Solomon (p. 137-139); "Scrap Preparation and Charging by Armco Steel Corporation", H. M. Parker (p. 139-140); and "Charging Practice at Continental Steel Corporation", John F. Richardson (p. 141-142). (D2, A8, ST)

116-D. Furnace Design for Cold-Metal Shops. Oliver P. Luetscher. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 142-147; discussion, p. 147-149.

Requirements of furnace for melting high-scrap charges which include large doors, a high roof, and exceptionally sharp working. (D2, ST)

117-D. Use of Metallurgical Oxygen at American Steel Foundries. L. L. Whitney. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 150-155.

Reviews experiences. Use with fuel oil to melt scrap and to remove carbon. (D2, B22, ST)

118-D. Use of Oxygen at Keystone. E. H. Reyer. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 156-158.

Use by injection and as an agent in combustion of fuels in scrap meltdown. Advantages and disadvantages. (D2, B22, ST)

119-D. Multiple-Burner Firing for Open-Hearth Furnaces. R. R. Fayles. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 158-160; discussion, p. 160-161.

Experiments with various designs and operations in Lukens Steel Co. openhearth shops. Results, to date, have been erratic and no definite conclusions as to their value have been reached. (D2, ST)

120-D. The All-Basic Furnace in Canada. A. K. Moore. *Proceedings, National Open Hearth Committee, Iron*

and Steel Division, American Institute of Mining and Metallurgical Engineers, v. 32, 1949, p. 177-178.

Productive and economic data on furnace at the Steel Co. of Canada. (D2, ST)

121-D. The All-Basic Furnace at South Works. M. F. Yarotsky. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 179-181.

Production, operating delays, fuel economy, metallurgical features of quality, and over-all economy of the product manufactured at South Works, Carnegie-Illinois Steel Corp. (D2, ST)

122-D. Basic Ends, Homestead Open Hearth. H. E. Warren Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 182-188; discussion, p. 188-189.

Construction of No. 53 furnace, Homestead Works, Carnegie-Illinois Steel Corp. Relative merits of basic ends. (D2, ST)

123-D. Armco Basic-End Furnaces, Middletown. E. R. Westfall. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 190-191; discussion, p. 191-194.

Compares net cost of repairs per net ton on a campaign basis for basic-end and silica-end construction. (D2, ST)

124-D. Use of Sillimanite for Lining a Hot-Metal Mixer. A. Maupin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 194-203; discussion, p. 203-205.

Service tests and results. Profitable use depends upon mixer design and operation. (D2, ST)

125-D. Rammed Lining for Metal Mixer. F. A. Colledge. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 205-209; discussion, p. 209-210.

Use of plastic super-duty fireclay ramming mix for patching was found to have definite limitations, particularly as to size of patching job. (D2, ST)

126-D. Deoxidation Vs. Surface Quality. L. R. Silliman and H. J. Forsyth. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 218-221; discussion, 221-224.

Concerned with hot-topped coarse-grained steels. (D2, ST)

127-D. Deoxidation Practice for Semikilled, Capped and Rimmed Steels. S. Feigenbaum. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 225-227; discussion, p. 227-230.
(D2, ST)

128-D. The Problem of Foaming in the Open-Hearth Bath. B. M. Larsen. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 231-233; discussion, p. 233-241.

Theory of foaming and questions for possible experimental consideration. (D2, ST)

129-D. Advantages and Disadvantages of Mechanically Capped Ingots. Oscar Pearson. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 249-253.

Compared with rimmed steel, with special emphasis on ingot structure, surface quality, yield and physical characteristics. (D9, ST)

130-D. Advantages and Disadvantages of Mechanically Capped Ingots. G. M. Yocom. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 253-255.

Capped ingots made by Wheeling Steel Corp., compare with rimmed steel. (D9, ST)

131-D. Factors Affecting Surface Quality of Capped Steel. L. Van Ormer. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 255-256; discussion, p. 256.
(D9, ST)

132-D. Time Interval Between Last Oxygen Pipe and Tap. C. G. McCabe. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 257-258; discussion, p. 258-259.

Results of questionnaire to obtain various operators' opinions. Most plants reported no restrictions. (D2, ST)

133-D. Effect of Nitrogen In Improving Physical Properties of Low-Carbon Steel. S. C. Faddis. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 260-263; discussion, p. 263.

Nitrogen in low-carbon rimmed, semikilled, and capped steels improves tensile strength, yield point, hardness, stiffness, and resistance to fluting in hot-rolled or cold-rolled strip-mill products. However, improvement depends upon effectiveness of N_2 control in steelmaking processes. (D2, Q general, ST)

134-D. A Study of Factors Affecting Surface Quality of Various Steel Products. L. R. Walker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 278-284.

Previously abstracted from *Industrial Heating.* See item 2B-217, 1949. (D9, F21, ST)

135-D. Late Ore Additions Not Detrimental to Surface Conditions of Castings. F. H. Allison, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 295-299; discussion, p. 299-304.

Ten heats with ore additions made within 21-32 min. before tapping were compared to 10 with additions at least 50 min. before tapping. Short or long refining times and early or late ore additions (21 min. before tap) have no effect on large acid open-hearth castings poured in dry sand molds. (D2, B22, ST)

136-D. Foaming in Acid Open-Hearth Ladle Slags Has No Connection With the Gas Content of the Metal. T. J. Ondocsin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 304-305; discussion, p. 305-306.

Attempts to prove the above from observation. (D2, ST)

137-D. Either a High Rate of Carbon Drop or Melting in on a Boil Close to Go-Ahead Analysis Produces the Best Physical Properties. G. S. Baldwin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 306-308; discussion, p. 308-310.
(D2, ST)

138-D. Electric Smelting of Iron Ores for Production of Alloy Ores and Steel and Recovery of Chromium and Vanadium. William Bleloch. *Journal of the Chemical Metallurgical & Mining Society of South Africa,* v. 50, Jan. 1950, p. 176-179.

Replies to discussion of his paper (Mar. 1949 issue; see item 2B-196, 1949). (D8, Fe, Cr, V)

139-D. Concentration Changes Resulting From Holding Basic Steel in the Converter After Termination of the Refining Process. (In German.) Werner Geller. *Stahl und Eisen,* v. 70, Feb. 16, 1950, p. 145-146.

Experiments with seven basic steels in a 20-ton converter showed that holding for 10-30 min. did not affect its composition, with the exception of a slight change in phosphorus content. (D3, ST)

140-D. Temperature Measurements of Molten Pig Iron for the Basic Bessemer Converter. (In German.) Theo Kootz. *Stahl und Eisen,* v. 70, Mar. 2, 1950, p. 186-191; discussion, p. 191-192.

How the temperature of blast-furnace pig iron affects the quality of basic converter steel. Causes of errors in temperature measurements; it is shown that the true temperature of the pig iron is that of the optical pyrometer plus 80° C. for bright pig iron, or plus 55° C. if covered with an oxide film. Effect of heat loss in the ladle. (D1, D3, S16, ST)

141-D. Evaluation of the Bessemer Process in the Small Converter. (In German.) Erich Lanzendorfer. *Neue Giesserei,* v. 37 (new ser., v. 3), Feb. 23, 1950, p. 65-72.

The different types of bessemer steel production, and raw-material costs of different charges. How Si content required can be determined by examination of fractured test specimens. Diagrams show converters of 1.5-3.0 tons capacity; photographs show how the melting process can be evaluated by the height of the flame and by appearance of the showers of sparks from the converter mouth. Patented process in which it is claimed that re-use of the converter slag reduces melting loss to 4%. Causes of converter explosions and effect of temperature on the loss of Si and C. (D3, ST)

142-D. Silicon Monoxide Produced During Smelting of Acid Steel. (In Russian.) P. V. Gel'd, A. I. Kholadov, and N. N. Buinov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 679-682.

Intermediate products liberated during reduction of Si in electric smelting of steel and a series of ferrous alloys were thoroughly investigated. Includes electron micrographs of substances deposited on a sheet of polished steel. (D5, M21, ST)

143-D. The Practice of Bottom Pouring Steel. Part I. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 38, May 1950, p. 515-520.

Advantages include the use of long molds, longer mold life, cleaner ingot surface, larger ingot yields, and cleaner steel. Disadvantages are also outlined. (D9, ST)

144-D. Effect of Hot Metal on Open Hearth Production. William A. Greene. *Blast Furnace and Steel Plant,* v. 38, May 1950, p. 521-528.

Economic and technological factors in connection with the percentage Mn, Si, P, and S in the hot-metal charge from the blast furnace. Quantitative data are charted. (D2, ST)

145-D. Effect of Iron Quality on Bessemer Blowing Problems. R. E. Edwards. *Journal of Metals,* v. 188, May 1950, p. 736-743.

Comprehensive discussion illustrated by experimental data. (D3, ST)

146-D. Faster Open Hearth Charging. Vernon W. Jones. *Journal of Metals,* v. 188, May 1950, p. 744-745.

Improved methods and equipment used by Armco Steel Corp. (D2, ST)

147-D. Modern Blast Furnace Gas Cleaning Practices. G. P. Burks.*Journal of Metals,* v. 188, May 1950, p. 746-750.

Equipment and procedures of Gary Works, Carnegie-Illinois Steel Corp. (D1, Fe)

148-D. Blowing Out Carbon Hearth Furnaces. W. R. Zehner; C. P. Johnson. *Journal of Metals,* v. 188, May 1950, p. 751-753.

Companion articles describe practice of Bethlehem Steel and Interlake Iron Corp., respectively. (D1, Fe)

149-D. Performance of High Magnesia Ramming Mixes. Rudolph Smith. *Journal of Metals,* v. 188, May 1950, p. 754.

Experiences of Colorado Fuel & Iron Corp. in use of above for open-hearth bottoms. (D2, ST)

150-D. Side-Blow Converter Process for the Production of Low Nitrogen Steel Ingots. R. R. Webster and H. T. Clark. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 778-790.

Investigated as a possible commercial process. Two converters of 3-ton and 22-ton capacity were operated on a pilot-plant basis for a total of 214 heats. The steel made was low in nitrogen and possessed good cold working properties. Some problems of converter operation remain to be solved. 10 ref. (D3, ST)

151-D. Manganese Recovery in Acid Electric Steelmaking. Sam F. Carter. *American Foundrymen's Society,* Preprint No. 50-5, 1950, 20 pages.

Concurrent metal and slag analysis before and after Mn addition is correlated. Slag composition, desired metal analysis, temperature, time, slag fluidity, quantity of slag, and ladle additions. Effects of additives and of oxygen. 10 ref. (D5, ST)

152-D. Effect of Coke Stability on Operation of Blast Furnaces. James F. Peters. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 7-25; discussion, p. 25-31.

Coke plant, screening system, and stability tests at Inland Steel Co.'s pig-iron plant. Correlates stability with amount of breeze screened from coke, and in turn correlates these data with blast-furnace operation. (D1, CI)

153-D. Distinctions Between Large and Small Blast Furnaces at the Inland Steel Company. T. F. Plimpton. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 101-107; discussion, p. 122-131.

Differences in performance, economy, ease of control, etc. Data are given for the eight Inland furnaces. It was concluded that still larger furnaces might give additional savings. (D1, ST)

154-D. Some Aspects of Operation of Large and Small Blast Furnaces. G. P. Burks. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 107-115; discussion, p. 122-131.

Reviews size trend in U. S. and compares furnaces of Carnegie-Illinois Steel Corp., Gary, Ind. Effect of quality of raw material, coke rate, and uniformity of product. (D1, ST)

155-D. Operating Data on Small Furnaces Versus Large Furnaces. J. Knox Dye. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 116-120; discussion, p. 122-131.

Compares three furnaces of Armco Steel Corp., Ashland, Ky., all using the same coke. (D1, ST)

156-D. Operating Data on Small and Large Blast Furnaces. C. F. Hoffman. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 121-122; discussion, p. 122-131.

Compares operations of furnaces at the Sparrows Point plant of Bethlehem Steel Co., for one month. They used the same ore, same coke, and same stone, and other factors were comparable. (D1, ST)

157-D. Use of Oxygen and Steam Blast in the Small Converter. (In German.) Hans Kosmider and Paul E. Hardt. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 303-320; discussion, p. 320-321.

Experimental work on use of the above in a 2-ton converter. Effects of various blast, slag, and metal-composition factors on quality of the product. Improved arrangement for blowing consisting of a series of copper tubes, imbedded in a dolomite-tar mass. 95 ref. (D3, ST)

158-D. Refining Basic Steel With Superheated Steam or Oxygen. (In German.) Wilhelm vor dem Esche. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 322-326.

Experiments with a 40-ton converter showed that the steam process permits production of steel with a N content of 0.005-0.009% and increases the probability of attaining the desired steel composition. Effect of impurities on resistance of the steel to aging was also studied. (D3, ST)

159-D. The Thermal Economy of the Basic Converter in the Refining of Pig Iron With Gases Other Than Air. (In German.) Ernst Karwat. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 326-330.

Thermal equations for refining of pig iron with O_2, CO_2, H_2O, and mixtures of these gases; compares their respective thermal efficiencies. Data are tabulated. (D3, ST)

160-D. (Book) Proceedings of the 32nd Conference, National Open Hearth Committee of the Iron and Steel Divisions, American Institute of Mining and Metallurgical Engineers, v. 32, 1949, 327 pages. The Institute, 29 West 39th St., New York 18, N. Y. $10.00 ($7.50 to members).

Papers presented at conference, including general remarks and reports. Twenty-two papers are on basic openhearth; 11 papers on cold-metal operations and basic foundry practice; 10 papers on refractories and masonry; 3 on metallurgy of the openhearth process; 8 on quality; and 5 on acid openhearth operations. Individual papers are abstracted separately.

161-D. (Book) Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee (vol. 8, 1949). 235 pages. 1950. Iron and Steel Div., American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. $10.00 ($7.00 to members).

Covers Chicago meeting of Apr. 18-20, 1949. Papers deal with blast-furnace and coke-oven practice, sintering and nodulizing of iron ores, and iron-ore mining and blending. (Selected papers are abstracted separately.) (D1, B general, Fe)

E

FOUNDRY

148-E. Principles of Gating Design; Factors Influencing Molten Steel Flow From Finger Gating Systems. W. H. Johnson, W. O. Baker, and W. S. Pellini. *American Foundryman,* v. 17, Apr. 1950, p. 106-113.

Factors which influence uniformity of discharge of molten steel into a mold cavity through multiple openings in a horizontal plane, as in finger-gating systems; or which determine sequence of flow through openings in a vertical plane, as in step-gating systems. Based on observations recorded by motion-picture photography. (E22, C1)

149-E. Test Bar Committee Reports. Walter Bonsack, chairman. *American Foundryman,* v. 17, Apr. 1950, p. 114-116.

Results of an investigation of the use of tension-test bars in the light-alloy foundry industry. The problem included several basic questions such as design of the test-bar casting including sprues, runner, gating, and risering systems used; pouring temperatures; and phases of casting production being controlled. (E23, Q27, Al, Mg)

150-E. Precision Casting Aluminum in Moist Investment Molds. H. Rosenthal and S. Lipson. *American Foundryman,* v. 17, Apr. 1950, p. 122-126.

Technique developed for retaining varying amounts of moisture in plaster-bonded investment molds in order to improve the properties of the alloys. The new mold consists of a precoat applied to the wax patterns, over which a backing investment is poured. Test bars showed an increase of 15% in tensile strength. Potential savings in investment material and in labor requirements are indicated. (E15, Al)

151-E. Optimum Aluminum Additions in Commercial Yellow Brass. R. A. Colton and R. H. Gilbert. *American Foundryman,* v. 17, Apr. 1950, p. 135-139.

Experiments were conducted to determine the effect of Al on the tensile properties and castability of commercial yellow brass while elongation is reduced continuously as Al content increases. When Al contents are in excess of 0.5%, tensile and yield strengths increase rapidly. Casting behavior, castability, and film-formation effects. (E25, Q23, Cu)

152-E. Permanent Mold Casting of Magnesium Hammer Handles. E. M. Cramer and B. Mohr. *Light Metal Age,* v. 8, Apr. 1950, p. 11, 24-25.

Recommendations on a method of casting, comparison of the strength of hickory and magnesium handles, and yield obtained in terms of metal poured. Weight requirements necessitated that the handle be hollow with a minimum wall thickness of about ⅛ in. (E12, T6, Mg)

153-E. World's Largest Induction Furnace for Aluminum Melting in Op-

eration at Vanadium Corp. Plant. Manuel Tama. *Instrumentation,* v. 4, 1st qtr. 1950, p. 14-15.
(E10, Al)

154-E. New Process Casts Soil Pipe at High Rate. William G. Gude. *Foundry,* v. 78, May 1950, p. 128-131, 258, 260.
Centrifugal casting equipment and procedure used by Combustion Engineering Superheater, Inc., at Chattanooga, Tenn. (E14, CI)

155-E. What the Foundry Expects of the Pattern Shop. Chester V. Nass. *Foundry,* v. 78, May 1950, p. 132-133, 306-309.
Cooperative planning by the engineering department, pattern shop, and foundry. Patternmaking fundamentals. (E17)

156-E. Heading and Gating Practice. Fred B. Riggan and Harold Schulte. *Foundry,* v. 78, May 1950, p. 134-137.
The important influence of the above on quality, cost, and yield in the steel foundry is illustrated by citing examples of specific castings. (E22, CI)

157-E. Navy Modernizes Foundries. Edwin Bremer. *Foundry,* v. 78, May 1950, p. 138-141, 310-312.
Various foundries of U. S. Naval Gun Factory, Washington.
(E general)

158-E. Effect of Oxidation in Cupola Melting on Annealability of Malleable Iron. Milton Tilley. *Foundry,* v. 78, May 1950, p. 142-143, 313.
A method for evaluating effect of oxidation. How the malleable foundry can alleviate some of its troubles with castability and annealing. (E25, J23, CI)

159-E. Automatic Features Incorporated in New Mold Drying Ovens. *Foundry,* v. 78, May 1950, p. 195.
Modern drying ovens recently installed in Oil Well Supply Co.'s foundry. (E19)

160-E. Casting Diesel Engine Bearings. Robert H. Herrmann. *Foundry,* v. 78, May 1950, p. 246, 249.
Procedures at Cleveland Graphite Bronze Co. The bearings consist of steel shells with copper-lead linings (75-85% Cu). The graphite cores used may be salvaged and re-used. (E16, Cu)

161-E. British Application of Simultaneous Jolt-Squeeze Molding Machines. A. G. Thomson. *Foundry,* v. 78, May 1950, p. 250, 253-254, 256.
(E19)

162-E. Small Foundry Employs Modern Methods. *Foundry,* v. 78, May 1950, p. 262, 264.
Equipment and procedures of Brooks Furnace Co., Albion, Mich., a producer of gray-iron castings. (E11, CI)

163-E. Tilting Crucible Facilitates Casting Aluminum in Permanent Molds. *Industrial Heating,* v. 17, Apr. 1950, p. 602, 604, 741-742.
A permanent mold is fastened on the top of a tilting crucible so that when it is tilted the molten metal runs into the mold. Cycle of operation is completely automatic.
(E12, Al)

164-E. Plastic Used in New Casting Process. *Modern Metals,* v. 6, Apr. 1950, p. 26.
Croning process, a new method for producing cores and molds for sand castings. (E19, E21)

165-E. Magnesium Die Casting in Germany. Part III. (Concluded.) Alfred F. Bauer. *Modern Metals,* v. 6, Apr. 1950, p. 31-35.
Report on the Mg die-casting industry in Germany. Dies and Mg alloys used by the Germans; economy of Mg die castings and several of their notable applications. (E13, Mg)

166-E. Utilization of Open-Hearth Bath-Temperature Measurements in the Production of Steel Castings. W. D. Lawther. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 168-175.
The effect that temperature may have on certain defects and mechanical properties of steel castings.
(E23, S16, ST)

167-E. Metal Fluidity for a Given Steel is a Function Only of Temperature. Guy M. Neagley, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 287-291; discussion, p. 291-295.
Effect of the mold, the molten metal, inclusions, composition, and temperature on fluidity. Considers validity of title statement.
(E25, ST)

168-E. Work in a Jobbing Foundry. J. F. Dowell and H. London. *Foundry Trade Journal,* v. 88, Mar. 30, p. 341-347; Apr. 6, 1950, p. 365-369.
Comprehensive review of methods of tackling the out-of-the-ordinary jobs of working with a minimum of pattern equipment, and of application of green-sand, loam-sand, and dry-sand molding. (E11)

169-E Cast-Iron Components for Gas Cookers. A. Graham Thomson. *Foundry Trade Journal,* v. 88, Apr. 13, 1950, p. 403-405.
Production by sand casting at a British factory. (E11, CI)

170-E. Centrifugal Casting of Hollow Steel Tubes of Maximum Dimensions. (In German.) Werner Luckerath. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 209-218.
Defects, causes, and methods for their avoidance. Mold linings and the casting process are found to affect greatly the quality of the product. (E14, CN)

171-E. Some Preferred Precision Casting Alloys. *Product Engineering,* v. 21, May 1950, p. 159, 161, 163.
Tables show nominal compositions, heat treatments, physical and mechanical properties, etc., for carbon, alloy, and stainless steels; also Al, Co, Ni, and Cu alloys.
(E15, Q general, P general, J general, ST, Al, Co, Ni, Cu)

172-E. Electronics Speed Core Drying. John Dawson. *Iron Age,* v. 165, May 4, 1950, p. 90-93.
Equipment and procedures. Dielectric driers are shown to produce better sand cores more economically. (E21)

173-E. Physical Limitations of Precision Castings. *Iron Age,* v. 165, May 4, 1950, p. 93.
Design factors. (E15)

174-E. New Gun Relines Cupola in One Hour. Victor E. Hillman. *Iron Age,* v. 165, May 4, 1950, p. 94-95.
A wet refractory mix is shot from a high-velocity gun reducing overall relining costs by more than 50%. No hand ramming is required. Any thickness up to 10 in. can be applied. Details of equipment, procedure, and best patching mix.
(E10, CI)

175-E. Added O_2 Improves Cupola Output. E. S. Clark. *Iron Age,* v. 165, May 4, 1950, p. 96-100.
Extensive studies showed that oxygen enrichment of the cupola blast results in improved performance. Temperature at the spout was increased, less coke was needed per ton, melting rate was increased, and bridging was substantially decreased. (E10, B22, CI)

176-E. How To Use Seacoal in Molding Sands. H. L. Campbell. *Iron Age,* v. 165, May 4, 1950, p. 101-102.
Recommendation for use of finely ground bituminous coal in sand mixtures for making molds for iron castings. Proper blending for improved surfaces of the castings, and low ash, sulfur, and moisture contents, are essential. (E18, CI)

177-E. Production in Brass. Frank P. Cavenagh. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 62-65, 97.
Manufacture of brass plumbing fittings. Emphasis is on melting, sand casting, machining, and mechanical finishing operations.
(E11, G17, L10, Cu)

178-E. Influence of Temperature on Fluidity and Surface Appearance of Steel Castings. G. A. Lillieqvist. *American Foundrymen's Society,* Preprint No. 50-6, 1950, 6 pages.
Three types of temperature measuring equipment used in the investigation. Ladle preheat temperature, tapping temperatures, and correlation of pouring temperatures and casting defects are discussed with relation to bath-metal temperature control. (E25, S16, CI)

179-E. Influence of Dry Sand Conductivity on Rate of Freezing of Steel Slabs. V. Paschkis. *American Foundrymen's Society,* Preprint No. 50-7, 1950, 4 pages.
Changes in time of solidification when sands with different properties are used as mold material. Sands used were previously tested at Battelle Memorial Institute and described by C. F. Lucks. (E18, CI)

180-E. Nature of Mold Cavity Gases. Charles Locke and Richard L. Ashbrook. *American Foundrymen's Society,* Preprint No. 50-10, 1950, 11 pages.
Variables affecting pressures which develop in a mold cavity during pouring. Pressures were found to increase directly with increase of pouring rate and inversely with permeability. Cereal content of molding sand had an inappreciable effect on pressure. Increase of pressure had no appreciable effect on filling of the molds. Chemical analyses showed that H_2 was present in both dry and green sand molds. Other gases were CO, CO_2, N_2, O_2 and paraffins. No tests were performed to determine effects of gases on the steel. 10 ref. (E23, CI)

181-E. Some Effects of Deoxidizing Additions on Foundry Malleable Irons. R. W. Heine. *American Foundrymen's Society,* Preprint No. 50-11, 1950, 17 pages.
Extends previous laboratory work to white cast irons melted under foundry conditions. Considers above effects on nonmetallic inclusions, graphite nucleating tendencies, and rate of response to annealing. Discusses mechanical properties.
(E25, Q general, CI)

182-E. A Study of Factors Affecting Molding Sand Density, Shrinkage, Expansion and Workability. R. P. Schauss, R. F. Baley, and E. E. Woodliff. *American Foundrymen's Society,* Preprint No. 50-12, 1950, 9 pages.
A study of sands bonded with five common clay-type binders. Results of tests for free and confined expansion. Use of machined carbon specimen tubes in which the specimen is rammed for confined expansion. A relationship was established between these high-temperature properties and clay contents. (E18)

183-E. An Investigation of Metal Penetration in Steel Sand Cores. S. L. Gertsman and A. E. Murton. *American Foundrymen's Society,* Preprint No. 50-13, 1950, 9 pages.
Effect of "ferrostatic" pressure. The metal head of a standard casting was varied and the relative im-

portance of different sand variables was studied. Effects of ramming, pouring temperature, core temperatures, silica-flour wash, and wood flour. (E21, CI)

184-E. Standard Data for Bench Coremaking. H. R. Williams. *American Foundrymen's Society,* Preprint No. 50-18, 1950, 7 pages.

Principles used in applying the data. Only elements presenting a measurement problem are discussed. Sample curves on method used in developing a "fill-and-ram" standard. All illustrative figures are taken from time studies used to develop the data for a jobbing steel foundry. (E21, CI)

185-E. Phenolic Resin Core Binders; Effect of Core Composition on Physical Properties of Cores. J. E. McMillan and J. A. Wickett. *American Foundrymen's Society,* Preprint No. 50-20, 1950, 9 pages.

Reproducible and accurate physical property data were obtained from core mixes and correlated with core composition. Laboratory results were reproduced in the foundry. (E18)

186-E. Treatment of Bond Clays for Foundry Sand. A. E. Pavlish. *American Foundrymen's Society,* Preprint No. 50-24, 1950, 10 pages.

Treatment by base-exchange reactions, and effect of various lignin sulfonates on mechanical properties of clay-bonded sand. (E18)

187-E. Metal Melting; Application of Thermodynamic Principles to Melting Nonferrous Metals. Robert I. Moore. *American Foundrymen's Society,* Preprint No. 50-25, 1950, 5 pages.

Heat losses occurring in the furnace due to radiation, conduction, and convection. Means of achieving higher efficiency. Results for proposed conditions are calculated. (E10, EG-a)

188-E. Reproducibility of Foundry Sand Tests. B. H. Booth, P. C. Rosenthal, and H. W. Dietert. *American Foundrymen's Society,* Preprint No. 50-27, 1950, 9 pages.

Part 1 presents data from original laboratory tests. Part 2 summarizes conditions found in the various laboratories (testing identical samples) which accounted in a large part for variances from original data. (E18)

189-E. A Thermodynamic Study on Pinhole Formation in Steel Castings. Robert E. Savage and Howard F. Taylor. *American Foundrymen's Society,* Preprint No. 50-28, 1950, 4 pages.

Considers H_2,CO, and other gases as causes of pinholes. (E25, P12, CI)

190-E. Fayalite Reaction in Sand Molds Used for Making Steel Castings. Robert E. Savage and Howard F. Taylor. *American Foundrymen's Society,* Preprint No. 50-29, 1950, 12 pages.

Effect of atmospheres, mold material, metal, and other variables on mold-metal interface reactions. X-ray diffraction analysis. Fayalite ($2FeO \cdot SiO_2$) was the only product formed. (E19, CI)

191-E. An Investigation of Melting and Casting Procedures for High Purity Nickel. Douglas W. Grobecker. *American Foundrymen's Society,* Preprint No. 50-31, 1950, 8 pages.

Suitable procedure in which electrolytic Ni and scrap wire are melted in a monolithic sillimanite-lined induction furnace with additions of Ni_3O_4, C, Mn, Al, and Mg. Mold materials were graphite, uncoated and coated with a fired magnesia wash; compacted carbon; core sand; and dry sand (air-dried, skin-dried, and oven-dried). 12 ref. (E10, E11, Ni)

192-E. An Alloy Designed for Pattern Shops. S. Zuckor. *American Foundrymen's Society,* Preprint No. 50-32, 1950, 2 pages.

Cu-Si-Al-Mg alloy (composition not given), its mechanical properties, and melting and pouring practice. (E10, E11, Q general, Cu)

193-E. Pattern Materials and Production in Precision Investment Casting. E. I. Valyi. *American Foundrymen's Society,* Preprint No. 50-33, 1950, 10 pages.

Methods of modifying wax compositions and development of pattern plastics. Comparative physical characteristics of pattern waxes and plastics. Use of metal patterns. (E15, E17)

194-E. Casting of Magnesium-Rare Earth-Zirconium Alloys in Sand Molds. K. E. Nelson and F. P. Strieter. *American Foundrymen's Society,* Preprint No. 50-35, 1950, 6 pages.

Metal handling, casting, and tensile and creep properties of EK30 alloy (2.0-4.0% rare earth and 0.1-0.4% Zr) at room and elevated temperatures. Rare earth refers to Mischmetal (50% Ce, 20% La, 18% Nd, 6% Pr, and other rare earths). Use in high-temperature applications. 12 ref. (E11, Mg, EG-g)

195-E. Magnesium Foundry Practice in Canada. M. W. Martinson and J. W. Meier. *American Foundrymen's Society,* Preprint No. 50-44, 1950, 8 pages.

Production, applications, techniques, and materials. 17 ref. (E general, Mg)

196-E. Flowability of Molding Sands. William H. Moore. *American Foundrymen's Society,* Preprint No. 50-46, 1950, 9 pages.

Ventability, bondability, flowability, moisture content, and flowability control. (E 18)

197-E. Basic-Lined Cupola for Iron Melting. Sam F. Carter. *American Foundrymen's Society,* Preprint No. 50-50, 1950, 17 pages.

Production experience on small cupola with comparison of metal chemistry, slag chemistry, and refractory consumption. Ways to remove 0.10-0.32% P from charges of 0.30-0.80% P content. Describes 70 experimental heats with various fluxes designed for desulfurization. (E 10, CI)

198-E. Effect of Superheating and Casting Temperatures on Physical Properties and Solidification Characteristics of Tin Bronzes. Bernard N. Ames and Noah A. Kahn. *American Foundrymen's Society,* Preprint 50-54, 1950, 18 pages.

Effects of superheating, with and without phosphor-copper deoxidation, on tensile strength, ductility, macrostructure, microstructure, density, and pressure tightness of Navy gunmetal. Density of casting, test-bar designs, and mechanism of solidification. 24 ref. (E25, Q23, Cu)

199-E. Aluminum Alloy Castings: A Review of British Achievement. Frank Hudson. *American Foundrymen's Society,* Preprint No. 50-57, 1950, 17 pages.

Alloys in use today, metallurgical developments, and production methods. 15 ref. (E general, Al)

200-E. Cold Formed Flexible "Precision" Patterns and Core Boxes. R. B. Wagner and J. E. Wiss. *American Foundrymen's Society,* Preprint No. 50-65, 1950, 5 pages.

Method of making flexible cope-and-drag multiple patterns in a new type of synthetic rubber, starting with a single loose-piece split pattern. Illustrations show steps involved in this new approach, using these cold formed synthetic rubber compounds which have setting properties similar to Plaster of Paris. 17 ref. (E17)

201-E. Production Patterns and the Matchplate. R. F. Dalton. *American Foundrymen's Society,* Preprint No. 50-66, 1950, 6 pages.

Types of pattern equipment, economics of use of Al matchplates, and use of formulated metal-casting plaster in the matchplate industry. 17 ref. (E17, T5, Al)

202-E. Crucible Furnaces—Design and Layout. Robert I. Moore. *Canadian Metals,* v. 13, Apr. 1950, p. 14-16, 19.

Use in nonferrous foundries. (E10)

203-E. Patternmaking for General Engineering Castings. H. S. W. Britain. *Foundry Trade Journal,* v. 88, Apr. 13, 1950, p. 389-397; Apr. 20, 1950, p. 427-431; discussion, p. 432-433.

Historical background, the pattern shop itself, the equipment, and its capabilities. Pattern materials, metal patterns and coremaking. Numerous individual patterns are described as examples of green-sand, dry-sand, and loam casting. (E17)

204-E. Indian Foundry Industry. V. M. McGowan. *Foundry Trade Journal,* v. 88, Apr. 20, 1950, p. 417-423. A condensation.

The industry in general and specific information on the ferrous jobshop foundry of Indian Iron & Steel Co., Kulti, Bengal. (E general, CI)

205-E. Flow of Metal Through Runner Systems. D. F. B. Tedds. *Foundry Trade Journal,* v. 88, Apr. 27, 1950, p. 443-452.

Theoretical considerations, the practical approach, and methods of bottom gating. By using section molds in plaster-of-paris, attaching a glass front and using mercury, a photographic record of the metal stream as it enters the various designs of runner systems was obtained. For more general use, a turbulence cushion at the base of the sprue would be advantageous. 12 ref. (E22)

206-E. A Preliminary Study of the Solidification of Castings. R. W. Ruddle. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 1-36.

Techniques for measurement of temperatures used to study the mechanism of solidification in cylinder castings made in super-purity Al; Al alloys containing 4, 8, and 30% Cu; phosphor bronze; and Al bronze. Effects of small additions of Ti on solidification of super-purity Al and of 4% Cu aluminum alloy. Results show that super-purity Al and Al bronze solidify by "skin formation". The 4% Cu alloy and the phosphor bronze solidify in a "pasty" manner, solid and liquid coexisting during the greater part of the freezing period. Solidification times of different sizes of geometrically similar cylinders of the Al-Cu alloys were calculated and found to be in fair agreement with those measured. 13 ref. (E25, Al)

207-E. Correlation of Tensile Properties of Aluminium Alloy Plate Castings With Temperature Gradients During Solidification. R. W. Ruddle. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 37-59.

Temperature gradients existing in the above alloy containing 4.5% Cu were measured and correlated with soundness and tensile properties of specimens subsequently cut from the plates. Results show good correlation between tensile properties and longitudinal temperature gradients existing during the latter stages of freezing. A theoretical explanation for the effects observed. 11 ref. (E25, Q27, Al)

208-E. Cupola Operation; The Pro-

portional Blast System. N. P. Piennaar. *Iron and Steel,* v. 23, Apr. 1950, p. 111-115.

New method based on the experimentally determined ratio between melting rate and rate of air supply. It involves supplying air to the cupola in accordance with a delivery-time curve, corresponding to which a predetermined melting schedule may be followed. Theoretical and practical details, and advantages of the new technique. (E10, CI)

209-E. The Influence of Low Percentages of Certain Elements on the Microstructure of Pure Iron-Carbon Alloys and Cast Irons. W. J. Williams. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 407-422.

Influence of S, O_2, Si, and Mn was studied. Results prompted further experiments on influence of Al and O_2 additions to cast iron. Al additions modified the form of the MnS inclusions in cast irons and pure Fe-C-Mn-S alloys; vacuum melting and inoculation produced a similar effect. Experiments on synthetic production of cast iron from pure materials; also experiments on the influence of S additions to pure Fe-C-Si alloys. 16 ref. (E25, M27, CN, CI)

210-E. Laws of the Casting of Metals. (In German.) Sergei Traustel. *Metall,* v. 4, Mar. 1950, p. 85-87.

Experimentally deduced equations on cooling rates, temperature gradients, and casting rates for continuous casting of any metal. (E23)

211-E. Green Sand Casting of Steel. (In Swedish.) Nils-Ake Berglund. *Jernkontorets Annaler,* v. 134, no. 2, 1950, p. 41-83.

Purpose of investigation was to discover suitable molding sands, using Swedish raw materials. The experiments were carried out partly in the laboratory and partly on full-scale castings. For the laboratory, special testpieces were designed, for high sensitivity defects likely to arise when using green-sand molds. Formation of such defects as swells, adhesion, gas holes, scabs, sand holes, and sand inclusions. Effects of molding procedure, casting temperature, and deoxidation of the steel. 15 ref. (E18, CI)

212-E. The Process of Graphite Formation in Cast Iron. I. (In Japanese.) Isao Aoki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 16-22.

Results of microstructural investigation show that the formation process for flake graphite is essentially the same as for fine graphite, although appearance is very much different. (E25, CI)

213-E. Graphitization of Fe-C Alloy. (In Japanese.) Isao Aoki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 22-25.

Indicates that the formation of white, mottled, or gray cast iron is determined by rate of cooling. (E25, CI)

214-E. Influence of Certain Elements on the Formation of Nodular Graphite in Gray Cast Iron. (In Russian.) P. P. Petrosyan and S. E. Shou-Shakhbudagyan. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 1, 1950, p. 123-125.

Influence of basic alloying elements and rate of cooling on the character and form of graphite formation during addition to molten cast iron of metallic Mg and Mg alloys. (E25, CI)

215-E. Bases of Evaluation and Selection of Core Binders. (In Russian.) A. M. Lyass and I. B. Kumanin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 36-44.

Hydrophobic and hydrophilic organic and inorganic binding materials were investigated for use in production of cores for foundry use. Evaluation of binding materials according to specific strength is proposed. Recommended compositions for casting of iron and steel are tabulated. (E21, CI)

216-E. New Method of Production of Chills. (In Russian.) S. S. Nekrasov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 44-45.

Precision-casting technique as applied to production of cog-wheel cutters and three-sided cutters. Composition of wax molding material used; optimum conditions of casting. (E15, CI)

217-E. Design and Use of Die Casting Dies. Charles M. Franklin. *Tool Engineer,* v. 24, May 1950, p. 24-27. (E13)

218-E. Gating and Risering Tin Bronze Castings. Clyde L. Frear. *Foundry,* v. 78, May 1950, p. 126-127, 288-292.

First of series devoted to metallurgical considerations in the casting of tin bronzes. (To be continued.) (E22, Cu)

219-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry,* v. 78, May 1950, p. 144-145, 273-274, 276, 278, 280, 282-284, 286.

Grain shape and distribution and chemical composition and refractoriness of steel foundry sands. Effects of variations in these properties on castings produced. Second of a series of five articles. (E18, CI)

220-E. Bibliography of the Permanent Mold Process. Harold E. Bourassa. *Light Metal Age,* v. 8, Apr. 1950, p. 21, 30-34.

First installment of a classified bibliography. Early history, comparison with other casting processes, dimensional tolerances and design, and ferrous and nonferrous permanent-mold casting. (To be continued.) (E12)

221-E. Comparative Tests on Nisiloy and Other Inoculants. H. Morrogh. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1950, p. 355-369.

Nisiloy is essentially a Ni-Si alloy containing approximately 30% Si and 60% Ni. Various experiments were made to evaluate this material as an inoculant for cast iron and to compare it with other inoculants. Mechanical tests consisted of transverse, tensile, hardness, and impact tests. (E25, Q general, CI)

222-E. Basic Principles of Die Design: Sprues, Runners and Gates for Diecastings. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, Apr. 27, 1950, p. 608-613. (E13)

223-E. Factors Controlling the Incidence of Hot-Tearing in Aluminum Casting Alloys. D. C. G. Lees. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A78-A85; discussion, p. A117-A119.

Previously abstracted under similar title from *Metal Industry.* See item 3D-53, 1949. (E25, N12, Al)

224-E. Examples of Aluminium-Alloy Foundry Practice. J. Caven and H. W. Keeble. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A86-A100; discussion, p. A117-A119.

Previously abstracted from *Foundry Trade Journal.* See item 14D-35, 1949. (E11, E13, Al)

225-E. Some Notable Aluminium-Alloy Castings. A. R. Martin. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A101-A116; discussion, p. A117-A119.

Previously abstracted from *Foundry Trade Journal.* See item 14D-52 and 14D-54, 1949. (E11, Al)

226-E. Experiences With Ethyl Silicate in the Foundry. D. F. B. Tedds. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A120-A125; discussion, p. A125-A126.

Previously abstracted from "Ethyl Silicate; Applications of Specialized Foundry Problems", *Metal Industry.* See item 14A-106, 1949. (E19, E21, E15)

227-E. Problems in Bronze Foundry Practice. Austen J. Smith. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A127-A132; discussion, p. A132-A133.

Previously abstracted from *Foundry Trade Journal.* See item 14C-58, 1949. (E25, Cu)

228-E. Work of the Lake & Elliot Foundry Technical Committee. L. W. Sanders, C. H. Kain, R. J. Hart, W. L. Hardy, and J. W. Gardom. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A158-A171; discussion, p. A171-A174.

Researches on cast-steel test-bars, attempts made to establish a reliable and workable machinability test development of coated molding sands in the iron foundry, and experience with resin-bonded core sands. Mechanical property data are tabulated. (E18, Q general, CI)

229-E. Effect of Grain Shape on the Behaviour of Synthetic Core and Moulding Sands. W. J. Rees. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A175-A181; discussion, p. A181-184.

Previously abstracted from *Foundry Trade Journal.* See item 14A-134, 1949. (E18)

230-E. Casting Inspection. J. Howard Williams. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B1-B20.

Aspects of the above in the small general foundry. Refers for the most part to high-duty cast iron, but methods described are also applicable to steel and non-ferrous castings. (E general, S13, CI)

231-E. Synthetic Resin Core Binders. G. L. Harbach. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B30-B40; discussion, p. B40-B44.

Previously abstracted from *Foundry Trade Journal.* See item 14A-47, 1949. (E18)

232-E. Moulding and Casting a 5-ton Ingot Mould. J. Steele. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B45-B46.

Previously abstracted from *Foundry Trade Journal.* See item 14b-117, 1948. (E19, T5, CI)

233-E. Loam Moulding of an Evaporator-Body Casting. W. H. Hornby. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B53-B60. (E19, CI)

234-E. Factors for Immediate Consideration in Assisting in the Future Production of Medium and Heavy Iron Castings. G. W. Nicholls. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B61-B72; discussion, p. B72-B74.

Casting design, molding recommendations, and making large castings. (E11, CI)

235-E. Making a Turbine Casting for Hydro-Electric Plant. T. Rigby. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B75-B78; discussion, p. B78-B80.

Previously abstracted from *Foundry Trade Journal.* See item 14b-112, 1948. (E11, T25, CI)

236-E. Foundry Drying Systems. John B. Morton. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B81-B93.

Previously abstracted from *Foundry Trade Journal.* See item 14A-11, 1949. (E19, E21)

237-E. Cores, Core-Making and Core-Making Materials. J. G. Gilbert. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B94-B102.

Previously abstracted from *Foundry Trade Journal.* See item 14A-43, 1949. (E21)

238-E. The Solidification of Metals. E. Scheuer. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B103-B111.

Previously abstracted from *Foundry Trade Journal.* See item 4a-46, 1948. (E25)

239-E. Repetition Patternmaking. K. L. Futter. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B125-B128; discussion, p. B128-B131.

Previously abstracted from *Foundry Trade Journal.* See item 14a-148, 1948. (E17)

240-E. Making a Large Multi-Cylinder Diesel Crankcase. J. F. Barnes. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B132-B145.

Coremaking and molding. (E19, E21, T25, CI)

241-E. (Book) **Foundry Sand Practice; Malleable; Steel; Gray Iron; Non-Ferrous.** Ed. 3. Clyde A. Sanders. 112 pages. 1949. American Colloid Co., Chicago.

Practical recommendations for selection and use of synthetic and natural molding sands. Various types of bonding agents. Properties and use of Volday and Panther Creek bentonite. (E11, E18, CI)

242-E. (Book) **Foundry Core Practice.** Ed. 2. Harry W. Dietert. 548 pages. American Foundrymen's Society, 222 W. Adams St., Chicago. $10.00

First edition has been completely revised. Types of core sands, locations of deposits in the U. S., core-grinding materials, core mixtures, mechanical problems of producing cores and handling sand, determining the properties of cores and core mixtures, controlling core properties, knocking out cores, reclamation of core sand, economics of core production, casting surfaces affected by core sand, mixtures, and defects caused by faulty cores. Extensive bibliography. (E21)

243-E. (Book) **Miscele di Ghisa Nella Moderna Fonderia** (Cast Iron Mixtures in the Modern Foundry.) Mario Olivo. 214 pages. Ulrico Hoepli, Milan, Italy.

Designed to enable the Italian foundryman to make the best use of the ferrous casting raw materials found in Italy. Covers materials used in casting machinery and parts in virtually all major industries. (E general, CI)

F

PRIMARY MECHANICAL WORKING

108-F. Production of Semifinished Steel. Part III. Karl L. Fetters and H. H. Hottel *Steel,* v. 126, Apr. 24, 1950, p. 86, 88, 90, 93.

Construction and operation of three-high blooming mills, slabbing mills, and both types of billet mills. Surface conditioning of blooms, slabs, and billets. (F23, F29, CN)

109-F. Cold Roll Forming. Elmer J. Vanderploeg. *Steel,* v. 126, Apr. 24, 1950, p. 81-84; May 1, 1950, p. 91-93.

See abstract of "Cold Roll Forming of Sheet and Strip," *American Society of Mechanical Engineers,* Paper No. 49-S-3, 1949, item 19A-136, 1949. (F23)

110-F. New Rod Baking Ovens at Seneca Wire Are Modified Flash Bakers. *Industrial Heating,* v. 17, Apr. 1950, p. 669, 670, 672, 674.

Ovens at Seneca Wire & Mfg. Co., Fostoria, Ohio, each dry 17,000 lb. per hr. of lime-dipped steel rod and aluminum rod for wire drawing. Illustrated. (F28, ST, Al)

111-F. Modern Wire Nail Manufacture: How Ryland's Have Reorganized Their Nail Works. *Wire Industry,* v. 17, Apr. 1950, p. 334-338, 341.

Equipment and procedures of British firm. Includes finishing operations. (T7, F28, CN)

112-F. Research on the Causes of Defects in Drop Forgings. (In German.) Hermann Raunaus and Paul Gruner. *Stahl und Eisen,* v. 70, Mar. 30, 1950, p. 253-264.

The five most common causes of defective forgings resulting from improper drop-forge operation. (F22, ST)

113-F. Aircraft Fabrication Revolution? Alexander McSurely. *Aviation Week,* v. 52, Apr. 24, 1950, p. 15-16.

New extrusion process which squeezes out airplane skin for wings and fuselages complete with built-in stiffeners thus creating a new semifinished material for planes. Ribbed sheet suitable for airplane wings and fuselages is produced from 75S alloy. (F24, Al)

114-F. How To Use Extrusions of Copper and Its Alloys. R. Carson Dalzell and D. C. Finley. *Product Engineering,* v. 21, May 1950, p. 108-112.

Case histories of actual products bring out design characteristics and varied applications. Table gives physical, mechanical, and working properties; applications; and nominal compositions. (F24, Q general, Cu)

115-F. Designing Light-Alloy Forgings. G. D. Welty. *Machinery* (American), v. 56, May 1950, p. 177-183.

Selection of Al and Mg alloys for forging, and important points to be considered in designing such forgings. (F22, Al, Mg)

116-F. Production of Merchant Shapes. Fred S. High. *Steel,* v. 126, May 8, 1950, p. 94, 97, 100, 102, 106.

The various types of mills in use for rolling merchant shapes, together with typical pass arrangements used for the rolling of different sections. (F23)

117-F. Rolls and Rolling; Rods. Part XIV. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, May 1950, p. 529-540, 581, 583, 586.

Presents a variety of roll-pass diagrams for rods. (To be continued.) (F27)

118-F. Rolling Foil at Permanente. Wade Palmer. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 78-80.

Production of Al foil at Kaiser's new mill. (F23, Al)

119-F. From Steel Plate to 16 Inch Pipe. W. A. Connor. *Canadian Metals,* v. 13, Apr. 1950, p. 28-30.

Equipment and procedures for trimming, forming, arc-welding, finishing, and testing. (F26, CN)

120-F. Corrosion Resistant Tinplate A Product of Laboratory Design. *Canadian Metals,* v. 13, Apr. 1950, p. 38-39.

Development of improved procedures by American Can Co. Emphasizes cold-reduction process. (F23, T29, CN)

121-F. How To Control Friction and Heat in Cold Drawing. E. L. H. Bastian. *Iron Age,* v. 165, May 11, 1950, p. 77-79, 82.

Recommendations for the cold drawing of carbon and stainless steel, Cu, brass, Al, and Al alloys. (F26, F27, CN, SS, Cu, Al)

122-F. How To Make Extrusions. Anderson Ashburn. *American Machinist,* v. 94, May 15, 1950, p. 105-112.

Special report on equipment and procedures for both types of extrusion applied to miscellaneous ferrous and nonferrous metals. In one, a billet of hot metal is pushed through a die to form rod, bar, tube, or shape which is cut to length (billet extrusion). In the other, a slug is placed in a die and struck by a punch to extrude metal up into or around the punch or down through the die (impact extrusion). (F24, G5)

123-F. The Baking of Lime Coatings on Wire; Equipment Described. *Wire Industry,* v. 17, Mar. 1950, p. 257-258.

Coatings are applied to facilitate the steel wiredrawing operation. (F28, F1, ST)

124-F. Recent Practice in Tungsten Wire Manufacture. B. M. Pearson. *Wire Industry,* v. 17, Mar. 1950, p. 269-271.

Chemistry of production from WO_3, manufacture of tungsten powder, sintering, swaging, and wire drawing. Recrystallization phenomena and tabulated rupture strength and elongation percentages. (F28, H10, H15, W)

125-F. A £1,000,000 Forging Plant. *Machinery* (London), v. 76, Apr. 27, 1950, p. 591-597.

The 12-press battery at Bromsgrove Works of John Garrington & Sons, Ltd., in Britain. (F22, ST)

126-F. A Note on the Hot-Rolling of Cast Iron and an Examination of Some Rolled Cast Iron Samples of German Origin. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1950, p. 371-375.

The literature indicates that rolled cast iron has many attractive physical properties, but as far as is known the process has never passed the experimental stage. In German experiments, some lengths of rolled strip and bar were examined and four pieces of rod which had been rolled to various degrees of reduction were obtained for further examination and for verification of the high level of tensile strength claimed. Results of examination of the four samples and a few notes on attempts which have been made to hot roll cast iron. 11 ref. (F23, CI)

G

SECONDARY MECHANICAL WORKING

132-G. Band-Sawing Non-Ferrous Castings. H. J. Chamberland. *American Foundryman,* v. 17, Apr. 1950, p. 102-104.

Application of bandsawing methods in the cleaning of nonferrous castings. (G17, SG-a)

133-G. Powder Parts; Machined and Plated. Paul K. Scott. *Iron Age,* v. 165, Apr. 20, 1950, p. 87-90.

Application of machining and plating to lock production. Unusual machining operations on part made from brass powder. Chrome plating

techniques for powdered-brass locks. (G17, L17, H general, Cu, Cr)

134-G. Oxy-Acetylene Processes Speed Steel Fabrication. Charles I. Orr. *Western Metals,* v. 8, Apr. 1950, p. 28-30.

Flame cutting, flame hardening, and local heating for welding, done by oxy-acetylene flame in general preparation of steel stock for fabrication at Consolidated Western Steel Corp. (G22, J2, K general, ST)

135-G. An Efficient Production Line For Ice Cream Cabinets; A Photo Story of Fabricating, Welding, Finishing, Assembly and Handling Operations at Nash-Kelvinator Corp., Detroit. William Mikulas. *Finish,* v. 7, May 1950, p. 19-23.

(A5, K general, L general, T29 CN)

136-G. Straight-Line Production Cuts Costs For Hotpoint in Fabricating Dishwasher Cabinets. Erle F. Ross. *Steel,* v. 126, May 1, 1950, p. 94-96, 98, 101.

Blanking, piercing, forming, welding, and finishing equipment and procedures.
(G1, K3, L general, T10, CN)

137-G. Eliminating the "Tap-Tap" Department. Welman A. Shrader. *Aeronautical Engineering Review,* v. 9, Apr. 1950, p. 50-52.

In most plants there is a facetiously called "tap-tap" department where many man-hours are lost in tapping, pounding, and grinding out wrinkles and deformations. Marform process combines good features of steel-die forming with those of the Guerin rubber-pad process, and prevents wrinkle formation. (G1, Al)

138-G. Charts Simplify Light Metal Calculations. Tyler G. Hicks. *Light Metal Age,* v. 8, Apr. 1950, p. 8-10.

Charts permit rapid calculations for cutting, punching, drawing, and bending. Results are sufficiently accurate for all ordinary design and manufacturing work. (G1, Al, Mg)

139-G. A Comparative Description of the Marform Process. R. Burt Schulze. *Light Metal Age,* v. 8, Apr. 1950, p. 12-14, 32.

The Marform process for forming light metals, which combines the forming ability of a steel die with the economical tooling of the Guerin process. (G1, Al, Mg)

140-G. Manufacture of Fusion-Welded Pressure Vessels by Babcock and Wilcox, Limited. (Concluded.) *Engineering,* v. 169, Apr. 7, 1950, p. 373-375.

See item 127-G, 1950.
(G1, K1, T26, ST)

141-G. Spinning Looks Simple—Takes Know-How. *American Machinist,* v. 94, May 1, 1950, p. 100-101.

Picture story shows how Al or stainless steel cones are spun from flat blanks. (G13, Al, SS)

142-G. Change To New Screw Stock Steel Steps Up Production 33 Per Cent. *Steel,* v. 126, May 8, 1950, p. 89-90.

Increase in stud production as a result of switching to B-1113—Jones & Laughlin's newly developed E-steel. Tool life of equipment is also lengthened 25% on the average. (G17, T7, CN)

143-G. 1 Operation Replaces 5. *Steel,* v. 126, May 8, 1950, p. 90.

Previously, Kralinator Products Ltd., Preston, Ont., used five operations, namely, blanking, first drawing, annealing, pickling, and final drawing, to produce oil-filter shells. With new method, the filter shell is made in a single deep drawing operation from 14-gage hot rolled, pickled and oiled strip. (G4, CN)

144-G. Forming Extrusions and Rolled Sections. J. J. Sloan. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 70-73, 94-95.

Specialized equipment and procedures including degreeing, joggling, bending and rolling. Application is to Al alloys.
(G1, G6, G11, Al)

145-G. Here Is a New, Easily Made Tool for Cutting Stainless Welds. *Industry & Welding,* v. 23, May 1950, p. 38.

Tool which combines into one unit an air pistol and welding tongs. (G22, SS)

146-G. Death of the Old "Iron Horse". *Industry & Welding,* v. 23, May 1950, p. 42-44.

Dismantling of steam locomotives by torch cutting. (G22, CN)

147-G. Simple Method of Reducing Cylinder Sleeve Machining Costs. A. A. Herzberg. *Machinery* (American), v. 56, May 1950, p. 186-188.

How cost of machining cast-iron cylinder sleeves has been reduced substantially, rejections minimized, and quality greatly improved by simply turning and facing the castings prior to boring—a reversal of conventional practice. (G17, CI)

148-G. How To Draw Aluminum for Porcelain Enameling. *Ceramic Industry,* v. 54, May 1950, p. 61-62.

Recommendations for equipment and procedures. (G4, Al)

149-G. Nine Operations on Two Presses Cuts Stamping Costs of Toaster Shells. Wallace F. Ardussi. *Steel,* v. 126, May 15, 1950, p. 78-81.

Material used is 0.032-in., cold rolled steel strip. (G3, T10, CN)

150-G. The Oxy-Kinetic Flame Cutting Process. A. E. Leduc. *Engineers' Digest,* v. 11, Apr. 1950, p. 124-125. Translated and condensed from *L'Ossature Metallique,* v. 15, Jan. 1950, p. 37-41.

Equipment and procedure for flame cutting stainless steel. The jet of oxygen is charged with solid particles, thus strongly increasing its kinetic energy, and the slag is expelled by purely mechanical action. Favorable test results have been obtained with 18-8 stainless steels and special steels of still higher alloy content, as well as with cast iron. (G22, SS)

151-G. Thread Rolling—Principles and Practice. *Machine and Tool Blue Book,* v. 46, May 1950, p. 137-138, 140, 142, 146.

Special illustrated report on thread rolling, which is really a cold forging process, since the rolling forms a screw thread by displacement of metal, as opposed to removal or cutting of metal. During rolling, plastic deformation of the material takes place. This distortion has an important bearing on strength of the threaded part. (G12)

152-G. Marform Process. *Mechanical Engineering,* v. 72, May 1950, p. 415-416.

Combination of steel-die and Guerin rubber-forming process, developed by Glenn L. Martin Co., enables existing hydraulic presses to produce a variety of sheet-metal forms and deep-drawn parts with such precision that subsequent hand finishing is unnecessary.
(G1, Al, ST)

153-G. Metal Transfer in the Cutting Process. Milton C. Shaw and Charles D. Strang, Jr. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 349-350.

A fundamental study using a radioactvie specimen of SAE 4027 steel. The metal was machined under CCl_4. The tool was examined radiographically, showing that, even under the most ideal conditions of cutting fluid action, some welding occurs between the chip and tool face with attendant transfer of metal, and further that presence or absence of a built-up edge is merely a matter of degree. (G17, AY)

154-G. A Study of Cutting Face Finishes and Treatments on Twist Drill Performance. Charles E. Bierwirth. *American Society of Mechanical Engineers,* Paper No. 49-A-120, Dec. 1949, 11 pages.

Describes drills of two different types of steel and the eight surface finishes and treatments tested by drilling cast iron and steel forgings. Test procedure and performance results. 19 ref. (G17, TS)

155-G. Oxygen Cutting Processes in Steel Foundries. R. S. Babcock. *American Foundrymen's Society,* Preprint No. 50-39, 1950, 12 pages.

Latest developments in apparatus and operating techniques for removing risers, gates, excess material, heads, defects, and burned sand from stainless and carbon steels. Powder cutting for overcoming oxidation resistance of stainless steels. (G22, E24, CN, SS)

156-G. New Criteria for Predicting the Press Performance of Deep Drawing Sheets. W. T. Lankford, S. C. Snyder, and J. A. Bauscher. *Transactions of American Society for Metals,* v. 42, 1950, p. 1197-1225; discussion, p. 1225-1232.

Previously abstracted from Preprint. See item 19B-207, 1949.
(G4, Q23, ST)

157-G. Deep Drawing Copper Alloys; The Fundamental Principles of Die Design. G. Sachs. *Metal Industry,* v. 76, Apr. 14, 1950, p. 291-293; Apr. 21, 1950, p. 310-313. Translated from *Pro-Metal.*

Deals mainly with mechanical rather than with metallurgical aspects. Equations for calculating blank diameters corresponding to 28 cup shapes. (G4, Cu)

158-G. Rapid Cutting of "30KhGSA" Steel. (In Russian.) M. A. Makhatadze. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 14-15.

Investigation revealed that the above alloy steel (composition not given) is amenable to high-speed cutting (470 meters per min. or more). Influence of cutting speed, of rake angle, and of depth of cut; optimum cutting conditions.
(G17, AY)

159-G. Sharpness of Cutting Tool Edges and Quality of the Surface. (In Russian.) P. E. D'yachenko. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 19-20.

Influence of sharpness (radius of curvature) of the cutting edge on character of the finished surface—roughness, degree of stress hardening, and depth of such hardening. Influence of crystal structure of the steel being cut (sorbite, pearlite, etc.) on the machined surface.
(G17, ST)

160-G. Ford Makes Insignias From Precision Dies. H. B. Ihnken. *Iron Age,* v. 165, May 11, 1950, p. 72-74.

Insignias are pantograph-engraved onto punch blanks from master patterns 16 times actual size. Hand tooling achieves corner sharpness after engraving. Brass die blanks receive impressions by pressure mating with the hardened steel punch. (G2, Cu)

161-G. Recommended Sawing Practice for Copper Base Alloys. *Iron Age,* v. 165, May 11, 1950, p. 76.

Recommended speeds of hacksawing and bandsawing for 32 copper alloys, also machinability ratings, are tabulated. Other factors are discussed. (G17, Cu)

162-G. Hot Spot Machining. Part I. Sam Tour. *Tool Engineer,* v. 24, May 1950, p. 17-20.

Hot-spot machining differs from hot machining in that the whole piece is not heated. Only a spot ahead of the tool is heated and this spot is machined away as fast as it is heated. Non-mathematical explanation of fundamental principles of machining. It was reasoned that heating in the absence of coolant should make possible more rapid removal of metal. Results obtained for carbon steel and a series of alloy steels, using special equipment. (To be continued.) (G17, ST)

163-G. Forming Sheetmetal by the Marform Process. R. B. Schulze. *Tool Engineer*, v. 24, May 1950, p. 41-43.
Combination of steel-die drawing and Guerin rubber-pad process. Advantages. (G1)

164-G. How Steel Wool Is Made. Wm. M. Stocker, Jr. *American Machinist*, v. 94, May 15, 1950, p. 102-104.
Equipment and procedures. The wool is made from acid bessemer steel wire by cutting tools which produce threads having irregular cross section and sharp edges. (G17, CN)

165-G. Rules for Metal Spinning. *American Machinist*, v. 94, May 15, 1950, p. 133, 135.
In condensed form, clarified by diagrams, and with table of thickness and depth limitations for various ferrous and nonferrous metals and alloys. (G13)

166-G. Superior Machining at Lower Cost With MX. George R. Caskey. *Iron Age*, v. 165, May 18, 1950, p. 95-98.
Additional test data on new free-machining steel developed by Carnegie-Illinois. Claims saving of 16-22% on production runs. Comparative properties of MX vs. B-1113 show that the new steel has better elongation and reduction of area but lower strength. It steps up output and tool life, decreases downtime, improves finish and works to closer tolerances. (G17, Q23, CN, SG-k)

167-G. New Developments in Oxyacetylene Cutting Machines. W. Begerow and A. H. Yoch. *Welding Journal*, v. 29, May 1950, p. 382-387.
Special purpose and standard machines and their uses. (G22)

H
POWDER METALLURGY

35-H. Oil Cavity Increases Self Lubrication. Walter G. Patton. *Iron Age*, v. 165, Apr. 20, 1950, p. 91-92.
Production of powdered-metal parts with interior cavities which serve as oil reservoirs. The cavities prolong the self-lubricating properties of powdered-metal bearings by 500-600%. Materials are bronze or iron. (H13, Fe, Cu)

36-H. Powder Helical Gears: They Said It Couldn't Be Done. Andrew J. Wayson. *Iron Age*, v. 165, Apr. 20, 1950, p. 93-94.
Production of gears. Majority are iron or iron alloy, but some have been made of brass and bronze. Advantages and applications to small equipment. (H14, T7, Fe, Cu)

37-H. Designing Structural Parts for Powder Metallurgy. H. R. Clauser. *Materials & Methods*, v. 31, Apr. 1950, p. 56-59.
Principal design considerations and two case histories to illustrate the advantages of designing specifically for powder metallurgy. (H general)

38-H. Testing Iron Powders and Sintered Iron. (In German.) Rolf Schwalbe. *Stahl und Eisen*, v. 70, Mar. 16, 1950, p. 219-227.
Need for standardization of test methods in powder metallurgy. Methods of determining chemical and physical properties of iron powders and sintered iron compacts. Impact strength of sintered iron compared with that of Armco iron. 34 ref. (H11, Q6, Fe)

39-H. Influence of Active Lubricants on the Pressing and Sintering of Powdered Metals. (In Russian.) V. I. Likhtman and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 851-853.
Investigated for Fe, Cu, and Sn, using oleic acid dissolved in vaseline oil or in benzene (5-10 cc. of oleic acid per kg. of powder). (H13, Fe, Cu, Sn)

40-H. Effect of Change of Scale on Sintering Phenomena. Conyers Herring. *Journal of Applied Physics*, v. 21, Apr. 1950, p. 301-303.
When certain plausible assumptions are fulfilled, simple scaling laws govern the times required to produce, by sintering at a given temperature, geometrically similar changes in two or more systems of solid particles which are identical geometrically except for a difference of scale. Suggests that experimental studies of the effect of such a change of scale may prove valuable in identifying the predominant mechanism responsible for sintering under any particular set of conditions, and may also help to decide certain fundamental questions in fields such as creep and crystal growth. (H15)

41-H. Concerning the Uses of Copper Powder. (In German.) W. Katz. *Metall*, v. 4, Mar. 1950, p. 81-85.
Production of various sintered articles of Cu and Cu+Fe powders and their respective properties as compared with those of other materials. Copper wire extruded from sintered copper bars was found to have a higher conductivity than that made from cast copper. Sintered copper filters are superior to ceramic filters in strength and elasticity. Several methods of producing copper powder are outlined in tabular form. 12 ref. (H general, T general, Cu)

42-H. Investigation of Structural-Mechanical Properties of Powder-Metallurgy Products. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), v. 20, Feb. 1950, p. 102-103.
Investigation of the effects of surface-active agents (solutions of oleic acid in vaseline, etc.) on the pressing and sintering of metallic powders (Fe, Cu, and Sn). Data on elastic expansion after removal from the mold, electro-conductivity, and recrystallization temperature indicate that binders improve the mechanical properties of such products. (H14, Fe, Cu, Sn)

43-H. Plastic Bonding of Boron Powder. L. Hays and J. E. Burke. *U. S. Atomic Energy Commission*, AECD-2279, Oct. 4, 1944, 2 pages.
Wet tamping boron powder with methyl methacrylate monomer and polymerizing to produce a finished piece with a boron density of at least 1.6 g. per cc. Almost any shape can be made without constructing dies or using a press. (H14, B)

44-H. Bibliography on Powder Metallurgy With Emphasis on Porous Metals. Fred E. Croxton. *U. S. Atomic Energy Commission*, AECD-2763, Apr. 2, 1948, 26 pages.
Chemical Abstracts 1927-1947, *Engineering Index* 1946, and *Industrial Arts Index*, were searched for references with particular emphasis on pressing and sintering steps. Brief annotations are included. 233 ref. (H general)

45-H. The Applicability of Zirconium Carbide and Thorium Carbide in Sintered Hard-Metal Alloys. R. Kieffer. *Metall*, v. 4, Apr. 1950, p. 132-136.
Method of producing these carbides. Hardness comparisons with cobalt carbide sintered bodies. 20 ref. (H10, C, SG-j)

46-H. Sintering of Metallic Powders. (In Russian.) V. I. Likhtman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 323-325.
Mechanism of the process from theoretical and experimental points of view. (H15)

J
HEAT TREATMENT

97-J Mass Marquenching. W. C. Hiatt and W. B. Cheney. *Automotive Industries*, v. 102, Apr. 15, 1950, p. 32-33, 114.
Tells how International Harvester is producing gears, shafts, king pins, and other parts capable of greater service life since modernizing and rearranging heat treating facilities at its Fort Wayne works. In addition to increasing quality of the finished products, marquenching (interrupted quenching) has reduced distortion and eliminated need for quenching presses, plugs, and similar equipment. Parts treated are made from 8620-H, 4620-H, 4815-H, and 4820-H steels. (J26, T7, AY)

98-J. Carburizing Pastes Permit Fast Low-Cost Selective Hardening. Julius Fish. *Materials & Methods*, v. 31, Apr. 1950, p. 72-74.
Two special paste compounds—one for hardening, the other for insulating against hardening—which provide an economical means of carburizing small quantities of steel parts. (J28, ST)

99-J. Rotary Retort Carburizing Cuts Gas Consumption. A. H. Allen. *Steel*, v. 126, Apr. 24, 1950, p. 74-76.
System for continuous carburizing of small steel part which eliminates manual loading and unloading, and minimizes maintenance. (J28)

100-J. Controlled Heat Treatment of Clock Springs. *Industrial Heating*, v. 17, Apr. 1950, p. 608, 610, 612.
Procedures at Borg Products Div., George Borg Corp., Delavan, Wis. (J general, T7, AY)

101-J. Oxy-acetylene Flame Hardening in Commercial Heat Treatment. J. T. Howat *Industrial Heating*, v. 17, Apr. 1950, p. 624, 626, 628, 630, 632, 696, 698, 700, 702. A condensation.
Flame-hardening applications including treatments to prevent machinery failures, methods of meeting machinery service conditions, choice of flame hardening processes, applications of flame hardening equipment, choice of fuel, characteristics of acetylene, fuel costs, controllability of flame hardening, and physical properties of the hardened parts. (J2)

102-J. Effect of Hardenability of a Steel on the Results of Flame Hardening. (In German.) Hans Wilhelm Grönegress. *Stahl und Eisen*, v. 70, Mar. 2, 1950, p. 192-196.
Investigated for a 1% C unal-

loyed steel; a Mn steel containing 1% C, 2% Mn, and 0.1% V; and a Cr steel containing 1% C and 1.2% Cr. Effects of diameter of the specimen, hardness depth, and burner output on "critical" diameter (diameter at which the core is 95% as hard as the surface) were determined. 10 ref. (J26, J2, CN, AY)

103-J. Low-Temperature Treatment of Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 227-232; discussion, p. 232-233.

Reviews literature, especially from the standpoint of economic feasibility. Its effect lies mainly in the transformation of residual austenite into martensite, resulting in greater hardness and volume stability. 24 ref. (J26, N8, ST)

104-J Embrittlement of Hardened Steel by Annealing at 250 to 400° C. (In German.) Hans Schrader, Hans-Joachim Wiester, and Heinrich Stepmann. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 21-31.

Addition of more than 0.04% Al to steels (low-carbon, Cr-Mn, and Mn steels) greatly reduces the embrittling effect of annealing; 0.8% practically eliminates it. Precipitation of nitrides of Cr and Mn is suspected to be the cause of the brittleness. 35 ref. (J23, Q23, CN, AY)

105-J. Furnace Atmosphere for Malleable Annealing. W. D. McMillan. *American Foundrymen's Society,* Preprint No. 50-8, 1950, 9 pages.

Composition and chemical reactions of atmospheres used for malleabilizing white cast iron; causes of ferritic and pearlitic rims; compositions effective in retarding decarburization; practice and precautions necessary with inflammable atmospheres. Results for a high-nitrogen atmosphere. "Carbon pressure" and advantages of a low combustible atmosphere. (J23, CI)

106-J. Surface Hardening of Pearlitic Malleable Irons. S. H. Bush, W. P. Wood, and F. B. Rote. *American Foundrymen's Society,* Preprint 50-53, 1950, 14 pages.

Flame and induction heating followed by oil, water, or spray quenches have been used as hardening treatments for nine irons varying widely in chemical composition, production practices, and microstructures. Case hardness and depth were determined by superficial Rockwell or Rockwell C measurements and metallographic examination of etched specimens. (J26, CI)

107-J. A Quench Cracking Susceptibility Test for Hollow Cylinders. Cyril Wells, C. F. Sawyer, I. Broverman, and R. F. Mehl. *Transactions of American Society for Metals,* v. 42, 1950, p. 206-231; discussion, p. 231-232.

Previously abstracted from Preprint. See item 9-267, 1949. (J26, AY)

108-J. An Engineering Analysis of the Problem of Quench Cracking in Steel. J. W. Spretnak and Cyril Wells. *Transactions of American Society for Metals,* v. 42, 1950, p. 233-266; discussion, p. 266-269.

Previously abstracted from Preprint. See item 18B-166, 1949. (J26, AY)

109-J. Pre-Bore Quench for Hollow Cylinders. J. W. Spretnak and C. C. Busby. *Transactions of American Society for Metals,* v. 42, 1950, p. 270-279; discussion, p. 280-282.

Previously abstracted from Preprint. See item 18B-167, 1949. (J26, AY)

110-J. Effects of Quenching Rate and Quench-Aging on the Tensile Properties of Aluminum Alloy 61S. R. C. Lemon and H. Y. Hunsicker. *Transactions of American Society for Metals,* v. 42, 1950, p. 357-372; discussion, p. 372-375.

Previously abstracted from Preprint. See item 18D-14, 1949. (J26, Q27, Al)

111-J. Heat Treatment of Steel. S. L. Gertsman. *Canadian Metals,* v. 13, Apr. 1950, p. 9-11, 42, 44-45.

An educational lecture. Various processes and fundamental theory of heat treatment. (J general, N8, ST)

112-J. Heat Treatment of Steel Forgings for Gas Turbines. H. W. Kirkby. *Metallurgia,* v. 41, Apr. 1950, p. 317-320.

Solution of several metallurgical and handling problems which arose because of the necessity of heat treating at temperatures near 1200° C., followed in some cases by quenching. (J26, T25, AY)

113-J. Focus on Quenching. R. C. Stockton. *Metallurgia,* v. 41, Apr. 1950, p. 321-326.

Importance of the cooling rate in heat treatment operations and the characteristics of various quenching agents. Quenching equipment and recommended cooling rates. (J26)

114-J. Automatic Control of Electric Furnaces for Heat Treatment. Leo Walter. *Metallurgia,* v. 41, Apr. 1950, p. 326-331. (J general, S16)

115-J. Recent Heat-Treatment Furnace Installation. *Metallurgia,* v. 41, Apr. 1950, p. 332-340.

Some typical examples. (J general)

116-J. Radio-Frequency Heating by the Fabrication of Precision Machines and Apparatus. A. Leemann. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 33-36. Translated from the German.

Principles and equipment. (Title apparently should read "in the fabrication".) (J2)

117-J. Internal Stresses During Surface Hardening. (In Italian.) L. Locati and A. Ferro. *Metallurgia Italiana,* v. 42, Jan. 1950, p. 22-29.

Mechanism of formation of stresses, and formulas for determination. Importance of internal stress in finished products. Data on a carbon steel are tabulated and charted. (J26, Q25, CN)

118-J. Release of Residual Stresses in Quenched Alloys by Aging. (In Japanese.) Tadao Sano. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 13-15.

Studied for Ag-Cu, Ag-Mg, and Al-Cu alloys over a range of compositions. Includes phase diagrams. (J27, M24, Ag, Al)

119-J. The Decay of the Promotive Power of Carburizing Agents and Its Causes. (In Japanese) Eisho Fuji. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 23-28.

It is generally known that the promotive power of a carburizing agent gradually decreases on repeated use. Decay rates of $BaCO_3$, Na_2CO_3, and their mixtures were determined. Activity of Na_2CO_3 decreased most rapidly and that of the mixture the most slowly. Possible causes. (J28, ST)

120-J. Fundamental Study of Mild Carburization. II and III. (In Japanese.) Masuo Kawakami and Eisho Fuji. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 25-30.

In Part II, mild carburization in the presence of inhibitors such as Al_2O_3 or $Ca_3(PO_4)_2$ and of promoters such as $BaCO_3$ or Na_2CO_3 was studied. Part III: A quantitative mathematical analysis shows the results of interaction of inhibitors and promoters. 12 ref. (J28, ST)

121-J. Increasing the Strength of High Speed Toolsteels by Annealing. (In Russian.) E. I. Malinkina. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 21-23.

Influence of annealing at 720-780° C. on microstructure and mechanical properties of the high speed steels. (J23, TS)

122-J. Heat Treating Stainless Steel. L. F. Spencer. *Iron Age,* v. 165, May 11, 1950, p. 65-69; May 18, 1950, p. 86-89.

Characteristics of stainless steels and heat treatment procedures for obtaining desired properties. Includes typical microstructures, graphs of mechanical properties vs. quenching and tempering temperatures, and a table of chemical corrosion resistance vs. quenching temperature. Second part describes furnace equipment and methods, also various pickling procedures. (J general, Q general, R5, L12, SS)

123-J. Ammonia Saves Money in Atmosphere Annealing. L. H. Seabright and N. K. Koebel. *Iron Age,* v. 165, May 18, 1950, p. 81-85.

How substantial savings can be realized by using a 75% H_2 + 25% N_2 mixture for annealing electric metals. The atmosphere is produced in an ammonia dissociator, eliminating storage and handling of cylinder hydrogen. Includes tables of magnetic properties of Armco magnetic iron, showing effects of annealing procedure (H_2 or dissociated NH_3), and of electroplating. Comparative magnetic properties of 1% Si and 4% Si steels and of Allegheny 4750 (47% Ni, 53% Fe.) (J23, J2, P16, Fe, AY, Ni)

124-J. Prepared Protective Atmospheres. E. G. deCoriolis. *Iron and Steel Engineer,* v. 27, Apr. 1950, p. 76-82.

Various types of atmospheres for use in the steel industry. Diagrams and illustrations show details of construction of gas-generating equipment made by Surface Combustion Corp. (J2, ST)

125-J. Stress-Relief Heat Treatment of Alloy Cast Iron. M. M. Hallett. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A28-A39; discussion, p. A33-A39.

Previously abstracted from *Foundry Trade Journal.* See item 18B-159, 1949. (J1, CI)

126-J. The Influence of Heating Rate in Malleable Iron Annealing. S. W. Palmer. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A40-A58; discussion, p. A59-A60.

Previously abstracted from *Engineering.* See item 18B-139, 1949. (J23, CI)

127-J. Strengths Obtainable by High-Temperature Age Hardening of Magnesium Alloys Containing 7% Al. (In German.) W. Bulian. *Metall,* v. 4, Apr. 1950, p. 136-137.

The alloys investigated contained 7.25% Al, 1.0% Zn, 0.1% Mn, and balance Mg. They were aged at 150-220° C. for 15-50 hours. Results show that optimum results are obtained upon aging at 200° C. for 20 hr. Effects of impurities and degree of hot working. (J27, Q23, Mg)

K

JOINING

259-K. Improved Technique for Flash Welding Aluminum Tubing

Eliminates Interior Flash. Charles Bruno. *Steel,* v. 126, Apr. 24, 1950, p. 79-80.

Equipment and procedure. Since extremely thin welds are much stronger than thick ones, the joints are practically as strong as the metal itself. Al can also be joined to Cu, stainless steel, monel, and to other alloys because the fusion zone is so small that practically no intermixing occurs. (K3, Al)

260-K. Hot Skinning With Light Metal Sheet. Gilbert C. Close. *Light Metal Age,* v. 8, Apr. 1950, p. 6-7, 16.

Method which eliminates buckles and wrinkles. It was developed by Northrop engineers for application of thin, light-metal sheets (Al or Mg) to structural members. Heating pads and mechanical tension are applied before riveting. (K13, Al)

261-K Ultrasonics Aid Soldering. *Iron Age,* v. 165, Apr. 27, 1950, p. 90.

Soldering of Al and other light metals and alloys is made easier by means of a new ultrasonic soldering iron. It consists essentially of a removable copper soldering bit and a magneto-striction transducer. No flux is required and standard soft solders may be used. (K7, Al, Mg)

262-K. Bronze Welding; Procedures for Different Metals and Applications. T. J. Palmer. *Welding,* v. 18, Apr. 1950, p. 159-164.

Includes photomicrographs showing typical deposits and joints. (K8)

263-K. Aluminum-Sheathed Cables; an Application of Cold Pressure Welding. *Welding,* v. 18, Apr. 1950, p. 165. (K5, Al)

264-K. Joining Large Sections of Low Alloy Steels by Gas Pressure Welding. A. I. Nussbaum. *Materials & Methods,* v. 31, Apr. 1950, p. 60-62.

Minimum weight, less machining, and lower welding costs have resulted from adopting gas pressure welding for fabricating aircraft landing gear. (K2, T24, AY)

265-K Low-Carbon Stainless Steels Make Possible Savings in Welded Fabrication. John B. Campbell. *Materials & Methods,* v. 31, Apr. 1950, p. 63-66.

By eliminating need for expensive stabilizing elements and post-welding anneals, the relatively new low-carbon steels reduce cost of fabricating corrosion resistant alloys for a wide range of applications. Mechanical properties and chemical corrosion resistance. (K general, R5, SS)

266-K. Special Jigs and Positioners Speed Production of All-Welded Steel Boats. *Steel,* v. 126, May 1, 1950, p. 90. (K1, T22, CN)

267-K. Glass to Metal Seals. Edwin Ruh. *Ceramic Age,* v. 55, Apr. 1950, p. 236-237, 244.

Mechanism of adhesion, the various types, their properties, and applications. (K11)

268-K. Rubber Bonding. J. M. Buist and W. J. S. Naunton. *IRI Transactions,* v. 25, Apr. 1950, p. 378-406.

Types of bonding agents other than brass plating. Bonding properties of PI and CDR cements with different metals compared; application of bonding agents in the production of rubber-metal engineering units; and common causes of failure of such units. Testing of both textile and metal-bonding agents, and a new method of testing proposed to replace the present ASTM method. Effects of shape factor and stiffness of the rubber. 11 ref. (K11)

269-K. How To Fusion Weld Cast Iron. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Apr. 1950, p. 29-34.

Recommended procedures. (K2, CI)

270-K. A New Technique in the Manufacture of Soldered Porcelain Potheads. A. E. Papp and J. H. Nicholas. *Transactions of the American Institute of Electrical Engineers,* v. 68, 1949, p. 1258-1260; discussion, p. 1261-1262.

Used for joining copper cables to porcelain. (K7, T1, Cu)

271-K. Weldability of Converter Steels and Their Use in Welded Construction. (In German.) H. Buchholtz. *Schweissen und Schneiden,* v. 2, Feb. 1950, p. 23-32; Mar. 1950, p. 51-55.

Properties and weldability of nonkilled basic bessemer steel, of PN steels (0.012% N and 0.06% P max.), and of "Alto" steels (killed with Si and Al), also results of welding tests with rolled steels and thin, medium, and heavy sheet steel. Applicability to various uses. Concluding part. 10 ref. (K9, CN)

272-K. Temperature Curve of the Base Metal During Multilayer Arc Welding. (In Russian.) N. N. Rykalin and I. D. Kulagin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 132-152.

Various factors affecting the above were investigated for butt, lap, tee, and cross welds in low-alloy structural steel. Includes extensive tables and numerous time-temperature curves, also schematic diagrams of the weld types and designs investigated. (K1, CN)

273-K Automatic Welding of Two-Ply Sheets Clad With "08Kh12" Steel. (In Russian.) K. V. Lyubavskii and B. I. Lazarev *Avtogennoe Delo.* (Welding), Jan. 1950, p. 1-10.

Welding of low-carbon steel sheet with stainless-steel cladding. Characteristics of welds obtained by use of three types of electrodes. Special features of the apparatus and optimum welding conditions. (K1, CN, SS)

274-K Process of Fusion During Flash Welding. (In Russian.) A. A. Alov. *Avtogennoe Delo* (Welding), Jan. 1950, p. 11-12.

Investigated from the points of view of three different but simultaneous processes: Formation of "bridges" at contact points due to heat caused by short circuiting, appearance of the "pinch effect" in electric conductors under the influence of an electro-magnetic field, and increase of the coefficient of self-induction due to geometric shape. (K3)

275-K. Welding of 18-8 Steel Containing Molybdenum. (In Russian.) I. Z. Kagan *Avtogennoe Delo* (Welding), Jan. 1950, p. 17-18.

Effect of adding 2-4% Mo to 18-8 stainless was investigated, especially with respect to welding characteristics. (K general, SS)

276-K. Soldering of Stainless Steels With Soft Solders. (In Russian.) S. N. Lotsmanov and A. S. Medvedev. *Avtogennoe Delo* (Welding), Jan. 1950, p. 18-21.

Optimum conditions of soldering for different fluxes. Special advantages and disadvantages of acid and anticorrosive fluxes. (K7, SS)

277-K. Special Fixture Welds Tractor Hoods. Herman J. Schaefer. *American Machinist,* v. 94, May 1, 1950, p. 83.

Spot welding equipment used by Oliver Corp. (K3, T21, CN)

278-K. New Flash Butt-Welder Joins ¼-Inch Strip in 10 Seconds. Dan Reebel. *Steel,* v. 126, May 8, 1950, p. 85-86.

U. S. built equipment for French plant, which is capable of flash welding the ends of 0.250-in. thick hot-rolled coils up to 62 in. in width. (K3, CN)

279-K. What About Welding Odors? Lew Gilbert. *Industry & Welding,* v. 23, May 1950, p. 24-26, 51.

Concludes that the problem is of little importance. (K general, A7)

280-K. Design for Silver Alloy Brazing. Part Two. Tapered Section in Rigid Members. *Industry & Welding,* v. 23, May 1950, p. 28, 30-31, 72-73. (K8)

281-K. Manual "Hidden Arc" Welding. *Industry & Welding,* v. 23, May 1950, p. 34-35, 37, 74.

Several examples of application to steel fabrication in different plants. (K1, ST)

282-K. Production Know-How Combines With Oxy-Acetylene Welding To Produce All-Welded Aluminum Chairs. *Industry & Welding,* v. 23, May 1950, p. 58, 60-61. (K2, T10, Al)

283-K. Home Built Pressure Welder Produces Precision Parts. Gilbert C. Close. *Industry & Welding,* v. 23, May 1950, p. 75-77.

Equipment for precision hot pressure welding of circular-ring components, including aircraft jet-engine blast-tube supports, high-pressure gaskets for oil-line valves and fittings, and rigging handling rings for shipyard and oil-field use. Applicable to ferrous and nonferrous metals. (K2)

284-K. Bi-Metallic Construction Extends Piston Life. *Product Engineering,* v. 21, May 1950, p. 100.

Ring area of Al-alloy pistons is subject to a high rate of wear. United Engine and Machine Co. of San Leandro, Calif., overcomes this problem by adding a ferrous metal insert to the top ring groove. The Al-Fin process is used to bond the insert to the Al alloy. (K5, T7, Al, ST)

285-K. Induction Brazing Lowers Convector Cost. *Product Engineering,* v. 21, May 1950, p. 101.

Convector air chamber, originally a heavy gray-iron casting, now consists of two stampings and two screw-machine parts silver brazed together. Results of redesign are improved appearance, reduced size and weight, faster production, and 15% decrease in cost. (K8, CI)

286-K. Modern Welding Techniques Cut Fabrication Costs of Solvent Extractor. *Steel,* v. 126, May 15, 1950, p. 82.

Five different applications of stud welding to stainless steel in fabrication of extractor by Vulcan Copper & Supply Co. (K1, SS)

287-K. Miter Welds Without Flash Made Possible by New Flash Welding Techniques. *Reynolds Metals Technical Advisor,* no. 13, [1950], p. 1-2.

Adaptation of percussion technique to miter welding of extruded Al sections. (K3, Al)

288-K. World's Largest Pumps for Grand Coulee Dam. W. E. Christison. *Welding Engineer,* v. 35, May 1950, p. 22-24.

Arc and gas welding, including choice of electrodes. Steel up to 5 in. thick is welded. (K1, K2, T4, CN)

289-K. Pressure Welds With Parent-Metal Strength. L. Van Camp and C. E. Levoe. *Welding Engineer,* v. 35, May 1950, p. 26-28.

Use of "Uniwelding" (a refinement of oxy-acetylene pressure welding) for fabrication of landing gear for large transport planes. Steels generally used are of the SAE 4100 and 4300 series. (K2, T24, AY)

290-K. Cabinets Reinforced by Carbon Arc. William C. Henzlik. *Welding Engineer,* v. 35, May 1950, p. 32-34.

How extra strength and rigidity are given to steel kitchen cabinets

by welding corners and joints with the carbon arc. Drawer guides are also brazed with the carbon arc. (K1, T10, CN)

291-K. Penstock Production Line. Jim Joseph. *Welding Engineer,* v. 35, May 1950, p. 36-37, 42.

Weld fabrication using automatic submerged-arc equipment of 20-ft.-long sections of 22-ft. diam. penstocks from curved sections of steel plate. (K1, T4, CN)

292-K. Here's What You Gain When You Weld With Low-Frequency Converters. C. B. Stadum. *Welding Engineer,* v. 35, May 1950, p. 38-40, 42.

Electrical system for arc welding. Includes circuit diagrams and graphs. (K1)

293-K. Nomograph for Weight of Electrode Metal Required. Tyler G. Hicks. *Welding Engineer,* v. 35, May 1950, p. 49.

(K1)

294-K. Salvage of Castings by Welding of Defects. B. E. Bellew. *American Foundrymen's Society,* Preprint No. 50-60, 1950, 6 pages.

Equipment, materials, electrodes, and techniques for welding of mild, low-alloy, and stainless steels; gray cast irons; and nonferrous castings, on the basis of economy, efficiency, and adaptation to foundry requirements. (K1)

295-K. Influence of Carbide-Forming Elements on Underbead Cracking of Low Alloy Steel. Raymond S. Stewart and Stephen F. Urban. *Transactions of American Society for Metals,* v. 42, 1950, p. 653-665.

Investigation to determine the effect of Ti, Zr, Cb, and V on the tendency of low-alloy steel to crack during arc welding. (K9, AY)

296-K. Welding and Assembly of Jet Propulsion Units; Methods Employed by the de Havilland Engine Co., Ltd. *Machinery* (London), v. 76, Apr. 20, 1950, p. 555-562.

Argon-arc welding equipment and procedures, also assembly operations, applied to stainless steel and Al alloys. (K1, T25, Al, SS)

297-K. Welding of Damaged Bronze Bells. (In German.) E. Wiese. *Schweissen und Schneiden,* v. 2, Mar. 1950, p. 45-51.

The correct method of welding cracked and broken church bells. (K general, T9, Cu)

298-K. Possible Defects of Automatically Riveted Joints and Methods for Their Prevention. (In Russian.) M. M. Kraichik and A. V. Obukhov. *Avtogennoe Delo* (Welding), Jan. 1950, p. 12-16.

Equipment and procedure for joining sheet metal by riveting followed by electric welding of the rivets to the sheet. Defects in the welds were studied for low-carbon steel. Principal types of defects were pores, circumferential lack of fusion, and hot cracks. Methods of detecting defects were studied and X-rays shown to be most applicable. (K1, K13, S13, CN)

299-K. Elimination of Deformation During Structural Welding. (In Russian.) G. A. Nikolaev and N. V. Shiganov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 48-52.

Investigated theoretically and experimentally. Application of an external load to the parts during their welding is recommended as a method of avoiding residual deformation. Influence of geometry, physical and mechanical properties of the metal, welding conditions, and types and amounts of stresses applied were studied. (K general, CN)

300-K. Designing for Welding. Harry W. Pierce. *Welding Journal,* v. 29, May 1950, p. 371-380.

An AWS educational lecture. General principles and examples. (K general)

301-K. Welded Deck Girder Highway Bridge. Gordon Cape. *Welding Journal,* v. 29, May 1950, p. 380-381.

Discusses paper by Ned L. Ashton (Sept. 1949 issue, item 22B-342, 1949), giving details of experiences of Dominion Bridge Co., Lachine, Quebec, Canada. (K1, T26, CN)

302-K. Problems Associated With the Welding of Stainless Clad Steel. A. L. Schaeffler. *Welding Journal,* v. 29, May 1950, p. 387-390.

Discussion of paper by Perry C. Arnold (Oct. 1949 issue, item 22B-372, 1949) includes description of extensive experimental work. Results of bend tests of simulated two-layer clad welds made in mild-steel plate using different electrodes. Tentative constitution diagrams for weld metal. (K9, M24, CN, SS)

303-K. Welded Fabrication in Heavy Plate. J. B. McCormick. *Welding Journal,* v. 29, May 1950, p. 403-405.

Arc welding and plate shaping equipment and procedures of Pelton Water Wheel Co., Los Angeles. (K1, G1, CN)

304-K. Mechanized Silver Brazing. *Welding Journal,* v. 29, May 1950, p. 405.

(K8)

305-K. Tests of Fillet Welds on Aluminum Alloy 61S-T6 Plate. R. L. Moore and J. M. Pickett. *Welding Journal,* v. 29, May 1950, p. 224s-230s.

Results of static tensile tests of argon-shielded, tungsten-arc transverse and longitudinal fillet welds. (K9, Al)

306-K. Energy Distribution in Electric Welding. C. E. Jackson and A. E. Shrubsall. *Welding Journal,* v. 29, May 1950, p. 231s-241s.

Experimental data show that increased speeds and current result in more efficient utilization of the energy available at the arc in both manual-arc and submerged-melt welding. Losses encountered when using various welding techniques are considered. (K1)

307-K. The Welding of High Nickel Alloys to Other Metals. N. C. Jessen. *Welding Journal,* v. 29, May 1950, p. 241s-242s.

Discusses paper by G. R. Pease and H. B. Bott (Jan. issue; see item 37-K, 1950). Includes authors' reply. (K1, Ni)

308-K. Notch Sensitivity of Welded Steel Plate. L. J. McGeady and R. D. Stout. *Welding Journal,* v. 29, May 1950, p. 243s-251s.

Final report of Welding Research Council's weldability project at Lehigh Univ. Criteria for determining transition temperature, rating notch toughness of structural grades of steel when welded, and effect of constraint during welding on notch toughness, were investigated. (K9, CN)

309-K. Discussion on "The Statistical Part in Welding Investigations". N. L. Navarre and W. E. Clautice. *Welding Journal,* v. 29, May 1950, p. 262s-264s.

Discusses paper by B. B. Day (Oct. 1949 issue, item 22A-235, 1949). Application of statistical planning to evaluation of the "clip test". This test is a weldability field or "spot" test for use in discriminating between those high-tensile steels which exhibit underbead cracking tendencies and those which do not. (K9, ST)

L CLEANING, COATING AND FINISHING

296-L. Selection and Application of Cleaning Room Equipment. Stanley Krzeszewski. *American Foundryman,* v. 17, Apr. 1950, p. 96-101.

Advantages and limitations of various types of equipment and procedures for cleaning up castings to prepare them for use or subsequent operations. Includes shot or grit airless blasting, tumbling, sand blasting, wet blasting, and pickling. Advantages of the first method. (L10, L12)

297-L. An Efficient Flow-Coating System. F. M. Burt. *Organic Finishing,* v. 11, Apr. 1950, p. 24-26.

System used to coat metal items which cannot successfully be spray-painted due to irregularity of shape, sharp edges, small surfaces, and other factors. (L26)

298-L. Sprayed Metal Coatings Improve Corrosion Resistance of Wide Range of Products. John E. Wakefield. *Materials & Methods,* v. 31, Apr. 1950, p. 67-69.

Use of metallizing for applying corrosion resistant nonferrous coatings. Tabular data on costs, rates of application, and life expectancies. Information deals with Zn, Al, Sn, and Pb, with emphasis on the first two. (L23, Zn, Al, Sn, Pb)

299-L. Electrostatic Process Improves Casting Finish. Thomas A. Dickinson. *Western Metals,* v. 8, Apr. 1950, p. 36-37.

Use of high-voltage, low-amperage electricity to polarize castings and sealants (or coating compounds) so that electromagnetic attraction will increase the number of sprayed particles that can be spray deposited without any extensive waste of finish materials; and will "detear" or remove excess materials from castings which have been pressure-sealed or dip-coated. (L26)

300-L. Fastest Electrolytic Tinplate Line Unwrapped by Weirton Steel Corp. *Iron Age,* v. 165, Apr. 27, 1950, p. 106-107.

Includes coiling, shearing, and inspection. (L17, F29, S13, CN, Sn)

301-L. Cleaning and Painting Yorkaire Units. Walter J. Fridinger. *Industrial Finishing,* v. 26, Apr. 1950, p. 26-27, 30, 32.

Finishing of air-conditioning units. (L12, L26)

302-L. Mass Production Finishing of Aluminum Refrigerator Pans. L. J. Reinhardt. *Industrial Finishing,* v. 26, Apr. 1950, p. 36-38, 40, 42.

Chemical washing, surface treating, oven dry-off, tack-ragging, spray painting, and electric-oven baking. (L26, Al)

303-L. Painting and Decorating Trailer Trucks. *Industrial Finishing,* v. 26, Apr. 1950, p. 50, 53-54.

Cleaning the metal; etching sheet-Al surfaces; and spray coating with various finishes. (L general, T21, Al)

304-L. Painting and Decorating Roadmaster Bicycles. C. J. Janosek. *Industrial Finishing,* v. 26, Apr. 1950, p. 60-62, 66, 68.

Includes cleaning and surface treatment. (L26, CN)

305-L. Avoiding Enamel Difficulties Through Proper Furnace Operation. M. Bozsin. *Finish,* v. 7, May 1950, p. 25-27, 78.

Control equipment and recommended procedures. (L27)

306-L. Filtering Practice for Plating Solutions. K. L. Carr. *Finish*, v. 7, May 1950, p. 29-30.

Some notes on filtration of various plating solutions with reference to methods and types of baths. (L17)

307-L. Brighter Finishes With "PR" Plating. George W. Jernstedt. *Steel*, v. 126, May 1, 1950, p. 86-88, 108, 110, 113-114, 116.

How periodic-reverse-current plating with a new inorganic addition agent is solving many electroplating problems, producing high luster and uniform density plates. On some applications, buffing and polishing costs can frequently be eliminated completely. Process is applicable to a wide variety of metals. (L17)

308-L. Sheet Metal Parts Degreased in Radiant Heat Oven. *Industrial Heating*, v. 17, Apr. 1950, p. 676-677.

Procedures at Lawson Mfg. Co., Pittsburgh. (L12)

309-L. Finishing Men's Jewelry and Haberdashery Hardware. *Plating*, v. 37, May 1950, p. 490-494.

Procedures at Hickok Manufacturing Co. (L17)

310-L. Preparation and Finishing of Metal Surfaces. B. M. Letsky. *Paint Manufacture*, v. 20, Apr. 1950, p. 124-127.

A general survey. (L26)

311-L. Plumbates as Paint Pigments. *Paint Manufacture*, v. 20, Apr. 1950, p. 128-132; discussion, p. 132-133, 139.

Use of alkaline-earth plumbates as pigments in paints designed to protect steel against corrosion and to reduce lead consumption as compared with other lead pigments. Experimental preparation, properties, and exposure-test results. Illustrated. (L26)

312-L. Methods for the Protection of Magnesium Alloys. W. F. Higgins. *Electroplating and Metal Finishing*, v. 3, Apr. 1950, p. 287-291.

Various coating methods for corrosion prevention. (L general, Mg)

313-L. Chemical Polishing; Some Technical Details. *Electroplating and Metal Finishing*, v. 3, Apr. 1950, p. 295-296.

Specific information concerning process developed at Battelle Memorial Institute and applicable to Cu, Ni, brass, monel, and german silver. (L12, Cu, Ni)

314-L. Producing Porcelain Enameled Signs. Thomas A. Dickinson. *Ceramic Age*, v. 55, Apr. 1950, p. 238-239.

Procedures. (L27, CN)

315-L. Plating on Aluminium. R. H. Keller. *Plating Notes*, v. 1, Dec. 1949, p. 66-93.

A review of various processes, indicating principal difficulties encountered, uses, and also methods of surface preparation prior to plating, and for testing the deposits. 45 ref. (L17, Al)

316-L. Galvanizing of Steel Sheets; Operational Formulae. John H. Mort. *Iron and Steel*, v. 23, Mar. 1950, p. 74-78; Apr. 1950, p. 125-130.

Hot-dip galvanizing equipment and procedures. Details of calculations required in the plant. (L16, CN, Zn)

317-L. Fusing of Enamels. J. A. Clarke. *Foundry Trade Journal*, v. 88, Apr. 6, 1950, p. 371-376; discussion, p. 376, 380.

Some general features of the process. Furnace design, instruments, atmospheres, refractories, and operational methods. Results of firing for varying times on metal samples. Development of the final finish is traced with particular emphasis on its chemical and physical aspects and on gas-bubble formation. (L27)

318-L. De-Enamelling. *Foundry Trade Journal*, v. 88, Apr. 6, 1950, p. 377-380.

Discusses paper by B. B. Kent (Feb. 2 issue; item 151-L, 1950). (L27)

319-L. From a Metallurgist's Notebook: Defective Deposits. H. H. Symonds. *Metal Industry*, v. 76, Apr. 7, 1950, p. 269-270.

Minute oxide or flux inclusions on or near the surface of the base metal were found to be the origin of defects in the deposit on silver-plated copper trays. (L17, Ag, Cu)

320-L. Antimony Plating; Bright Deposits From Complex Citrate Baths. K. G. Soderberg and H. L. Pinkerton. *Metal Industry*, v. 76, Apr. 7, 1950, p. 271-273. A condensation.

See abstract from *Plating*, item 169-L, 1950. (L17, Sb)

321-L. Improved Protection Against Corrosion. (In German.) P. Tesdorff. *Erdöl und Kohle*, v. 3, Mar. 1950, p. 127-128.

The "Sinoxal" process, in which an applied undercoat of a suitable material forms a crystalline, nearly nonporous and electrically passive film on steel surfaces, protecting the latter against many kinds of chemical corrosion. (L14, CN)

322-L. Cleaning Copper Parts. *American Machinist*, v. 94, May 1, 1950, p. 113.

Recommended procedures for removal of miscellaneous dirt. (L10, L12, Cu)

323-L. Stainless Steel Fabricating Costs Cut $100 Per Day. Arthur P. Schulze. *Steel*, v. 126, May 8, 1950, p. 82-84.

By using strippable plastic coatings, one manufacturer of commercial refrigeration cabinets expedites assembly and improves protection of stainless-steel sheets during fabrication, hiking production 14%. (L26, G general, SS)

324-L. Processing Cycles for Chromium Plating. Jerome L. Bleiweis. *Products Finishing*, v. 14, May 1950, p. 38, 40, 42, 44.

Recommended cycles for application of Cr plate to ferrous metals, Cu alloys, Zn die castings, Pb-base alloys, Al alloys, Mg alloys, and buffed Ni plate. (L17, Cr)

325-L. Developments in Galvanizing. F. G. White. *Products Finishing*, v. 14, May 1950, p. 48, 50, 52, 56. (L16, Zn, ST)

326-L. Metal Coatings Formed by Methods Other Than Electrodeposition. Allen G. Gray. *Products Finishing*, v. 14, May 1950, p. 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80.

Review of recent work at Battelle, Alcoa, and Commonwealth Engineering Co. Emphasizes paper presented by Bruce W. Gonser at section meetings of American Chemical Society and Electrochemical Society. Includes hot dip coatings, vapor-phase deposition, carbonyl gas plating, vacuum evaporation, and sprayed metal coatings. (L16, L23, L25)

327-L. Infra-Red Dries Porcelain Enamel Rapidly. *Products Finishing*, v. 14. May 1950, p. 88-89. (L27)

328-L. Power Brushing Used for Cleaning Shovel Blades. *Products Finishing*, v. 14, May 1950, p. 89. (L10)

329-L. Corrosion Protection of Power Transformers by Flow Coat Method. Siebert L. Miller. *Corrosion* (Technical Section), v. 6, May 1950, p. 144-147.

Results of several years' experience and experimentation using the Flow Coat method of applying stripping media and protective coatings. Advantages and possible disadvantages. (L26, T1)

330-L. Surface Preparation Values and Sandblasting Economics. A. J. Liebman. *Corrosion* (Technical Section), v. 6, May 1950, p. 151-157.

How necessary amount of surface preparation from technical and economic standpoints can be determined by preliminary calculations. Suitable surface-preparation methods with emphasis on sandblasting. Degree of cleanliness required should be specified in order to eliminate unnecessary work. Type of sand and grain size, as well as equipment, are also important. (L10)

331-L. Laboratory Tests of Protective Coatings Versus Service Results. W. T. Moran and G. E. Burnett. *ASTM Bulletin*, no. 165, Apr. 1950, p. 73-77; discussion, p. 77-80.

Relative merits and some experiences of the Bureau of Reclamation, with emphasis on protective coatings for metal work. (L general, S21)

332-L. New Electrolytic Line Boosts Nation's Tin Plate Capacity. *Steel*, v. 126, May 15, 1950, p. 104, 106.

Pickling, plating, and shearing equipment and procedures at new line of Weirton Steel. (L17, F29, CN, Sn)

333-L. Protective Coatings for Underwater Steel Structures. A. W. Van Heuckeroth, R. W. Hill, and G. S. Cook. *Symposium on Varnish and Paint Chemistry*, (College of Engineering, New York University), 1949, p. 41-50.

Conditions to be met and systems studied. (L26, ST)

334-L. Fungicidal and Solvent Retention Problems in Organic Film Coatings. Aubrey J. Raffalovich. *Symposium on Varnish and Paint Chemistry.* (College of Engineering, New York University), 1949, p. 51-60.

Coatings used in tropicalization of Signal Corps equipment. Includes micrographs and discussion of various coatings on steel, Cu, brass, glass, and phenolic plastic. (L26, ST, Cu)

335-L. The Electropolishing of Nickel in Urea-Ammonium Chloride Melts. T. P. Hoar and J. A. S. Mowat. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 1, 19 pages.)

Investigation to find the range of conditions under which electropolishing occurs. Its mechanism. (L13, Ni)

336-L. The Commercial Electrolytic Polishing of Stainless Steels. P. A. Charlesworth. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, (Advance Copy No. 2, 11 pages.)

New technique for and conditions for a commercial process. Solution, commercial-scale working, applications, advantages, and limitations. (L13, SS)

337-L. New Developments of Electrolytic Polishing. H. E. Zentler-Gordon. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 3, 8 pages.)

Mechanical vs. electrolytic polishing. Application to stainless and carbon steels, brasses, Al, and Al alloys. (L13, CN, SS, Cu, Al)

338-L. The Electrodeposition of Copper-Cadmium Alloys From Cyanide Solutions. E. E. Longhurst. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 5, 19 pages.)

Conditions under which Cu-Cd alloys can be deposited. Effect of "free" cyanide, pH of solution, cur-

rent density, and temperature. 11 ref. (L17, Cu, Cd)

339-L. The Electrodeposition of Tin-Cadmium Alloys. P. S. Bennett. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 6, 8 pages.)

Method for co-depositing Sn and Cd on steel from acid solutions of their sulphates using suitable addition agents. Corrosion resistance and solderability. 17 ref.
(L17, R general, K7, Cd, Sn, ST)

340-L. Further Work on the Electrodeposition and Properties of Speculum. P. S. Bennett. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 7, 12 pages.)

Bright speculum (40% Sn) plate may be obtained by addition of organic brighteners, alone or in conjunction with small amounts of Pb. For consistent deposits, extremely close control of all variables is necessary and current density must be as uniform as possible. Close chemical control of bath composition is essential. 12 ref. (L17, Cu)

341-L. The X-Ray Structure of Speculum Electrodeposits. H. P. Rooksby. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 8, 6 pages.)

Investigations on a (42% Sn) alloy deposited on Cu. Factors influencing bright or dull finish.
(L17, M22, Cu)

342-L. Studies in the Discontinuities in Electrodeposited Metallic Coatings. U. R. Evans and S. C. Shome. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 9, 24 pages.)

Ni and Co deposits were investigated. Effects of H_2 bubbles at the cathode, impurities on surface of base metal, surface contour of base metal, and internal stresses in deposit or base metal on discontinuities. Effects of current density, pH, and temperature on porosity. Composite plates of Ni and Cu, Co and Ni, and Co and Cr showed no promise of avoiding pinholes. 27 ref.
(L17, Ni, Co, Cu, Cr)

343-L. The Electrodeposition of Tin From Stannous Fluoborate Baths. N. Parkinson. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 10, 8 pages.)

Advantages, due to high rates of deposition. Composition of electrolyte, addition agents, plating equipment, base metals, pretreatments, anode behavior, and analytical control. Experimental results.
(L17, Sn)

344-L. The Etching of Aluminum for Direct Plating With Other Metals. J. M. Bryan. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 11, 6 pages.)

Development of a new process. Simple test, using a solution of iodine, for selecting etchants; washing procedure. Electrodeposition and chemical-displacement deposits of Ni and Cu were studied.
(L17, Al, Ni, Cu)

345-L. "Emulsion" Cleaning of Metals. G. Schmerling. *Journal of Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 12, 8 pages.)

Composition, methods of using, advantages, characteristics, and applications of emulsion cleaners. (L12)

346-L. Surface Active Agents in the Improvement of the Cleaning of Metals. R. C. Tarring. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 13, 8 pages.)

The actual relationship between solution and solid surface at the area of contact. (L12)

347-L. Porous Chrome Plating: The Chesterfield Works of British van der Horst Ltd. *Metal Industry*, v. 76, Apr. 21, 1950, p. 307-309.
(L17, Cr, ST)

348-L. Tin Coatings on Steel as a Basis for Protective Painting. S. C. Britton. *Journal of the Oil & Colour Chemists' Association*, v. 33, Mar. 1950, p. 125-134; discussion, p. 134-136.

Methods of applying tin coatings; corrosion resistance; adhesion of paint films to tin coatings; and the mode of action of tin under paint. Illustrations of exposure and adhesion test specimens. 11 ref.
(L26, L16, Sn, ST)

349-L. Plastics in the Plating Shop. V. Evans. *British Plastics*, v. 22, Apr. 1950, p. 162-170.

Miscellaneous applications. 15 ref.
(L17)

350-L. Pickling Tanks; Modern Developments in Construction. V. Evans. *Iron and Steel*, v. 23, Apr. 1950, p. 116-120.

12 ref. (L12)

351-L. Mechanism of Electrolytic Oxidation and of Formation of Aluminum Oxide Layers. (Concluded.) Jos. Patrie. *Revue de l'Aluminium*, v. 27, Jan. 1950, p. 3-7.

Conditions of electrolytic oxidation—influence of temperature of the bath and time of operation on properties of the oxide layer, from the point of view of resistance to corrosion and to wear—were investigated. Methods of determination of hardness and resistance to wear of such oxide layers. 32 ref. (L19, Al)

352-L. Mechanism of Vapor Deposition of Chromium and Other Elements. (In French.) Philippe Galmiche. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1181-1183.

Practical apparatus and procedure for deposition of Cr, Si, Al, Zr, etc., on iron or steel, by vapor diffusion from a special solid mixture, which releases the desired metal on heating in a stream of hydrogen.
(L25, Fe)

353-L. Determining the Adhesion of Enamel to Sheet Steel. (In German.) A. Dietzel and E. Wegner. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 26, Sept.-Oct. 1949, p. 132-137.

Advantages and disadvantages of different methods. Recommends Stuckert's method in which adhesiveness is determined by measuring the amount of "whiteness" on the metal surface after the enamel is mechanically removed. A system of classifying degrees of adhesiveness is also proposed. (L27, ST)

354-L. Observations on Sulfide Under-Coatings. (In German.) A. Dietzel. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 26, Sept.-Oct. 1949, p. 137-141.

Undesirable effects of too much sulfur in enamel undercoats on steel. Recommends compounds which form soluble sulfosalts (complexes) which are more resistant to oxidation than the simple sulfides. 11 ref. (L27, ST)

355-L. Research on Improvement of the Adhesion of Thick Silver Electrodeposits. (In Japanese.) Tadayoshi Inui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 28-31.

Procedure for production of deposits having good adhesive properties, consisting of removal of occluded hydrogen by anodic or thermal treatment, polishing and cleaning, acid dipping, plating (conditions given), and annealing.
(L17, Ag)

356-L. Protection of Al Alloys Against Corrosion. (In Japanese.) Hikozo Endo and Akira Itagaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 30-34.

Chemical and electrochemical methods developed by the authors. In the first, the alloys are treated at 60° C. with 2% NaOH for 2-3 min., then with a mixed aqueous solution of CaO, $CaSO_4$, $K_2Cr_2O_7$, KNO_3, Na_2SiO_3, and $KMnO_4$ for 20-30 min. In the second, the alloys are pretreated for 30 sec. with 2-3% NaOH at room temperature, then electrolyzed in 25% H_2SO_4, using a.c. for 5-60 min. Effectiveness was compared by immersion in 3% NaCl. 24 ref. (L14, Al)

357-L. Drag-Out Losses in Wire Plating. Part I. Joseph B. Kushner. *Wire and Wire Products*, v. 25, May 1950, p. 414-415, 418.

Determination of drag-out and liquid-film thickness. Drag-out is of considerable interest, particularly where precious metals such as gold and silver are being plated. It is the thin liquid film that clings to a wire as it emerges from the plating bath.
(To be continued.)
(L17, Ag, Au, EG-c)

358-L. Mill Rolls Salvaged by Stainless Facing. *Iron Age*, v. 165, May 18, 1950, p. 94.

How surfacing forged or cast steel conveyer rollers with stainless steel helped solve an acute maintenance problem for a large midwestern steel company.
(L24, T5, CN, CI, SS)

359-L. Automatic Electric Hard Facing. Turner G. Brashear, Jr. *Welding Journal*, v. 29, May 1950, p. 391-398.

Methods and fields open to the automatic submerged-melt hard-facing process. Varied applications.
(L24)

360-L. Corrosion in Salt Water Drilling. Lloyd A. Brudvig. *Drilling*, v. 11, May 1950, p. 60-61.

Emphasis on use of liquid plastic antifouling coating for protection of metal surfaces. Cu_2O is included in the formulation. (L26)

361-L. Brass Offers Colorful Possibilities as an Electroplated Finish for Die Castings. I. *Die Castings*, v. 8, Apr. 1950, p. 37-39; May 1950, p. 43-46.

Principles of brass plating; bath compositions and methods of control. Plating on Zn-base die castings. 13 ref. (L17, Zn, Cu)

362-L. Finishes for Zinc. *Die Castings*, v. 8, Apr. 1950, p. 49-50.

Four main types are mechanical, chemical, organic and plated finishes. (L general, Zn)

363-L. Shop Coat Structural Steel Paint Primers. S. C. Frye and G. Diehlman. *Bethlehem Steel Co. and National Lead Co.*, Progress Report No. 1, Apr. 1948, 56 pages.

See abstract of "An Investigation of Structural Steel Shop Coat Priming Paint," by S. C. Frye, *Corrosion*, item 7B-201, 1949. (L26, CN)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

148-M. Outer Brillouin Zones for the Face Centred Cubic, Body Centred Cubic and Close Packed Hexagonal Structures. R. L. Berry, M. B. Waldron, and G. V. Raynor. *Research*, v. 3, Apr. 1950, p. 195-196.

Investigation for polyvalent metals, titanium in particular. (M26, Ti)

149-M. An X-Ray Micro-Beam Examination of a Plastically Deformed Metal. J. N. Keller, P. B. Hirsch, and J. S. Thorp. *Nature,* v. 165, Apr. 8, 1950, p. 554-556.

Method consists of illuminating such a small volume of material that the continuous ring obtained with the usual techniques splits up into individual diffraction spots. This is done by using fine-bore, lead-glass capillaries and a high-intensity X-ray generator which gives an intensity of 50 times that of an ordinary tube. The method was tested with a specimen of cold-rolled spectroscopically pure Al. (M22, Al)

150-M. The Nature of the Bonds in Metals and Intermetallic Compounds. Linus Pauling. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 249-257; discussion, p. 257.

Conception formulated mainly on empirical arguments. Magnetic properties of transition metals, interatomic distances, and structure. (M26, P16)

151-M. X-Ray Studies of the Special Carbides in "Complex" Alloy Steels in the Annealed State. (In German.) Helmut Krainer. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 33-38.

Carbide phases in steels containing Cr, Mo, Cb, Ta, Ti, V, and/or W in varying proportions were investigated. 18 ref. (M26, AY)

152-M. X-Ray Investigation of Carbides in Tungsten, Molybdenum, and Vanadium Steels. (In German.) Helmut Krainer. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 39-41.

Results of above studies made it possible to complete the constitution diagrams of the W and Mo steels. $(FeW)_6C$ was found to be the basis for the high heat resistance of tungsten steels. Experiments showed that a 24 hr. anneal is insufficient to effect equilibrium between the carbides and the matrix of the 41 steels investigated. (M26, M24, AY)

153-M. Application of Group Theory to Analyses of the Anisotropy of Crystals. (In Russian.) N. S. Akulov and Ya. I. Fel'dshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 593-596.

Mathematical technique. (M26)

154-M. Clarification of the Constitution Diagram of the System Fe-Cr-C. (In Russian.) B. G. Livshits and K. V. Popov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 633-635.

Isothermal cross section of the above diagram was investigated at temperatures below critical point. Data derived from X-ray and chemical analysis of the carbides are tabulated. (M24, Fe, Cr)

155-M. Study of the Properties of Metals and Alloys at High Temperatures in a Vacuum. (In Russian.) N. T. Gustsov, M. G. Lozinskii, I. F. Zudin, W. A. Bogdanov, and M. P. Matveeva. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 108-125.

Recently developed method of investigating structure and mechanical properties of metals and alloys over wide temperature range in vacuum. (M23, Q general)

156-M. Sulfides in Alloy Steels. (In Russian.) Yu. T. Lukashevich-Duvanova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 126-131.

Complex sulfides present in alloy steel have a stronger bond with carbides than they have in carbon steels, and are separated from them only partially or not at all during cooling of the steel. Steels alloyed with Mo, Cr, W, V, Al, and Ti were investigated. (M26, AY)

157-M. Low Temperature X-Ray Diffraction Apparatus. Donald F. Clifton, *Review of Scientific Instruments,* v. 21, Apr. 1950, p. 339-342.

Two types of cameras giving variable temperatures. One, using cold gas blown over for cooling, permits putting the specimen in place under liquid nitrogen and keeping it at this temperature while it is aligned in the spectrometer. The other has a working range of 77-375° K., and uses liquid nitrogen as a coolant. (M22)

158-M. Dislocation Models of Crystal Grain Boundaries. W. T. Read and W. Shockley. *Physical Review,* ser. 2, v. 78, May 1, 1950, p. 275-289.

Energies and motions of grain boundaries between two crystallites were investigated theoretically using the dislocation model. Quantitative predictions for simple boundaries for cases in which the plane of the boundary contains the axis of relative rotation of the grains appear to agree with available experimental data. 27 ref. (M27)

159-M. The Structure of Evaporated Metal Films and Their Optical Properties. R. S. Sennett and G. D. Scott. *Journal of the Optical Society of America,* v. 40, Apr. 1950, p. 203-211.

Film structure for Ag, Au, Cu, Al, Sb, Ni, Pd, and Cr was observed in the electron microscope and correlated with optical properties. Rate of formation is shown to affect the structure and the optical properties, slow rates in general giving more aggregated structure and increased light absorption. The Garnett theory is used to explain the peculiar variation with thickness of the optical properties of thin metallic films in terms of structure and bulk properties of the metal. 25 ref. (M26, P17, L25, Ag, Au, Cu, Al, Sb, Ni, Pd, Cr)

160-M. A Lapping Technique to Improve the Image Quality of Electron Microscope Lenses. F. A. Hamm. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 271-278.

A lapping technique that effectively reduces the effect of imperfect machining (misalignment of components). Critical faces and the bores through the pole piece are lapped with a series of powders (alumina) which increase in fineness until the final process is that of polishing. A set of jigs and laps (brass and hard wood), their specifications and use. (M21)

161-M. Revealing the Grain Structure of Common Aluminum Alloy Metallographic Specimens. L. J. Barker. *Transactions of American Society for Metals,* v. 42, 1950, p. 347-356.

Technique which utilizes bi-refringent qualities of electrolytically produced anodic films and requires polarized light for examination. Photomicrography is possible with the use of filters. 10 ref. (M21, M27, Al)

162-M. Relationship of Inclusion Content and Transverse Ductility of a Chromium-Nickel-Molybdenum Gun Steel. John Welchner and Walter G. Hildorf. *Transactions of American Society for Metals,* v. 42, 1950, p. 455-473; discussion, p. 473-485.

Previously abstracted from Preprint. (M27, Q23, AY) See item 4B-92, 1949.

163-M. Fractographic Study of Deformation and Cleavage in Ingot Iron. C. A. Zapffe and C. O. Worden. *Transactions of American Society for Metals,* v. 42, 1950, p. 577-602; discussion, p. 602-603.

Previously abstracted from Preprint. See item 4B-95, 1949. (M23, Q24, Fe)

164-M. The Crystal Structures of Metallic Uranium. Charles W. Tucker, Jr. *Transactions of American Society for Metals,* v. 42, 1950, p. 762-770.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2716. See item 18-M, 1950. (M26, U)

165-M. The Effect of Vanadium and Carbon on the Constitution of High Speed Steel. Donald J. Blickwede, Morris Cohen, and George A. Roberts. *Transactions of American Society for Metals,* v. 42, 1950, p. 1161-1191; discussion, p. 1191-1196.

Previously abstracted from Preprint. See item 4B-93, 1949. (M24, TS)

166-M. Thorium-Carbon System. H. A. Wilhelm and P. Chiotti. *Transactions of American Society for Metals,* v. 42, 1950, p. 1295-1310.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2718. See item 111-M, 1950. (M24, Th)

167-M. The Uranium-Manganese and Uranium-Copper Alloy Systems. H. A. Wilhelm and O. N. Carlson. *Transactions of American Society for Metals,* v. 42, 1950, p. 1311-1325.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2717. See item 95-M, 1950. (M24, U, Mn, Cu)

168-M. The Electron Microscope in Metallurgy. Alfred L. Ellis. *American Iron and Steel Institute, Yearbook,* Preprint, 1950, 17 pages.

Replica technique and reliability of plastic replicas. Particle-size study and quantitative phase determination. Structure of martensite. Includes micrographs of carbon and alloys steels. (M21, CN, AY)

169-M. The Measurement of the Thermal Expansion of Single Crystals of Tin by an Interferometric Method. B. G. Childs and S. Weintroub. *Proceedings of the Physical Society,* v. 63, sec. B, Apr. 1, 1950, p. 267-277.

Single crystals of tin were grown by the Kapitza method, their orientations measured, and the crystals converted into sets of three spacers for use in an interferometric dilatometer. The apparatus, its assembly, and method of use. Linear expansion coefficients of six crystals of different orientations, were measured from 30 to 220° C. 13 ref. (M23, P11, Sn)

170-M. Use of Diamond Dust for Polishing Metallographic Specimens of Nonferrous Metals and Alloys. E. C. W. Perryman. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 61-64.

Rapid method for specimens containing two or more phases differing greatly in hardness, e.g. electrodeposited and galvanized coatings and multiphase structures. (M21, EG-a)

171-M. Electron Diffraction. Jean Ternisien. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 28-32. Translated from the French.

Fundamental principles, apparatus design, and applications. (M22)

172-M. Electron Diffraction Study of the Electropolishing of Single Crystals of Alpha and Beta Brass. (In French.) Noboru Takahashi. *Métaux & Corrosion,* v. 25, Feb. 1950, p. 37-43.

Includes diffraction patterns and crystal-lattice diagrams. (M22, Cu)

173-M. Corrosion Patterns Caused by Anodic Attack. Raymond Jacques-

son and Jack Manenc. *Comptes Rendus* (France), v. 230, Mar. 6, 1950, p. 959-960.

Utilization of etch patterns for determination of crystal structure of metals. Results and conditions for electrolytic etching of aluminum. (M21, Al)

174-M. Specific Etch Colorations on Iron-Silicon Alloys. A New Rapid Method for Identifying High-Silicon Iron Alloys. (In German.) E. Fitzer. *Werkstoffe und Korrosion,* v. 1, Mar. 1950, p. 103-104.

Electrographic method which consists of anodic oxidation of the alloys, followed by tinting with methylene blue. It is specific for Si in Fe and, since it brings out the microstructure of the alloy, it is suitable for metallographic examination. (M21, S11, Fe)

175-M. Transformation of the β-Phase in the Cu-Al System and the Effect of Mn Additions Upon It. V. Concerning the Relationships Among the Metastable Phases and Their Crystal Structures. (In Japanese.) Isao Tarora. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 1-4.

Atomic arrangements of supercooled structures of the β-phase (β_1, β', and γ') and their relationships. (M26, Cu, Al)

176-M. Single-Step Quartz Replica for Electron-Microscopic Investigation. (In Russian.) L. I. Zemlyanova, Ya. M. Kushnir, and A. I. Frimer. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 21, 1950, p. 991-993.

The technique of replica formation for several specific steels and nonferrous metals and alloys. Advantages of this type of replica. (M21)

177-M. Polarized Light Shows Nature of Plastic Deformation in Monel Metal. *Wire and Wire Products,* v. 25, May 1950, p. 423-425, 453.

Based on "Stages in the Deformation of Monel as Shown by Polarized Light", D. H. Woodard, *Journal of Metals* (Technical Section). See item 4C-115, 1949. (M27, Q24, Ni)

178-M. Caustic Etching Detects Fatigue Damage. Paul W. Boone. *Iron Age,* v. 165, May 18, 1950, p. 99-100.

Procedure based on use of a caustic etch plus microscopic examination at 10X-20X magnification which has proved to be very effective in detecting early fatigue damage in Al alloys. (M21, Q7, Al)

179-M. (Book) Beiträge zur Metallkündlichen Analyse. (Contributions to Metallurgical Analysis.) P. Klinger and W. Koch. 104 pages. 1949. Verlag Stahleisen, Düsseldorf, Germany. 15 DM.

Consists of three separate papers on isolating nonmetallic inclusions from carbon and alloy steels, and on studying them physically and chemically. Electrolysis and "chlorine vacuum sublimation" were successfully employed. The isolated specimens were analyzed spectrographically and their structures studied by optical refraction, ultramicroscopy, and conventional microscopy. (M27, S11)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

95-N. Transformation Characteristics of Induction-Heated Steels. *Industrial Heating,* v. 17, Apr. 1950, p. 614.

Condensed from "The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels", by Joseph F. Libsch, Wen-Pin Chuang, and William J. Murphy.

Previously abstracted from *American Society for Metals,* Preprint 21, 1949. See item 18B-168, 1949. (N8, J2, AY)

96-N. Surface Effect Occurring on High Carbon Steels Heated and Cooled in Vacua. G. C. Smith and M. J. Olney. *Research,* v. 3, Apr. 1950, p. 194.

It was observed that hypereutectoid steels, heated into the austenite region and cooled in high vacuum, become covered with a gray-black film. Nature of this film was investigated by electron diffraction, X-ray powder photography, and friction measurements. These investigations prove conclusively that the film consists of graphite. (N8, CN)

97-N. The Gas Phase in Equilibrium With a Solution of Carbon, Oxygen, Hydrogen, and Nitrogen in Liquid Iron. J. D. Fast. *Philips Research Reports,* v. 5, Feb. 1950, p. 37-45.

From literature data, composition of the gas phase in equilibrium with a dilute solution of C, O_2, H_2, and N_2 in liquid iron was computed. In the range from 1800 to 2000° K. equilibrium pressures are approximated by formulas presented. (N16, Fe)

98-N. An Electron-Microscopic Study of Metal Oxides and Metal Oxide Catalysts. James T. McCartney, Bernard Seligman, W. Keith Hall, and Robert B. Anderson. *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 505-519.

Changes in the above during reduction were studied by electron-microscopic and adsorption methods. Metal oxides sinter considerably during reduction; but in the presence of promoters or carriers, extent of sintering is decreased. The data are discussed with respect to Huttig's theory of sintering. The phenomena may be explained by surface diffusion of freshly formed metal. 20 ref. (N1, M21)

99-N. The Absorption of Gases by Titanium and Zirconium. C. F. P. Bevington, S. L. Martin, and D. H. Mathews. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 3-16.

Absorption of individual gases, and structures of the gas-metal systems. New data on the Ti-H and Zr-N systems and on the effect of absorbed O_2, N_2, and CO on sorption of H_2 presented. 45 ref. (N15, Ti, Zr)

100-N. The Extension of the Ar_1 Range With Carbide Formation in Mild Steel Due to High-Temperature Treatment. J. H. Whiteley. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 399-405.

Isolated areas containing large amounts of massive or free carbide in two mild steel ingots led to experimental work. It was found that when this steel was cooled slowly from a very high temperature, the Ar_1 range was widely extended and that the free carbide was formed directly from the residual austenite. Length of the extended range was determined by temperature of heating above 1200° C. and by Mn content. Effects appeared to be confined to mild and low-carbon steels. (N8, CN)

101-N. A Note on the Overheating of Steel. E. C. Rollason and D. F. T. Roberts. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 422-424.

From published data, it has been concluded that the amount of MnS present in a steel is an important criterion of minimum overheating temperature. A new graphical presentation shows that this temperature is a function of S content and Mn/S ratio. This helps to elucidate anomalous results. (N12, ST)

102-N. Recrystallization of Pure Iron After the $\gamma - \alpha$ Transformation. (In German.) Georg Masing. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 49-51.

Specimens of highly rolled sintered carbonyl iron were quenched in different media and to different temperatures. Results show that the gamma-to-alpha transformation leads to an unstable condition, having a tendency toward recrystallization. (N5, Fe)

103-N. Dilatometric Study of Crystal Growth at High Temperatures. (In Russian.) Ya. I. Ol'shanskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 641-643.

Technique for temperatures up to 2000° C. Experiments were performed on specimens of oil and coal-tar-pitch coke but apparently are also suitable for metals. (N12)

104-N. Energy of Activation of Superlattice Transformations. (In Russian.) N. S. Akulov and E. P. Svirina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 789-791.

Theoretical analysis of the above, followed by correlation with results of experimental investigation of the kinetics of the superlattice transformation in molybdenum permalloy (77.5% Ni, 19.5% Fe, 3% Mo) at 400, 440, 470, and 480° C. (N10, Ni)

105-N. Relationship Between Lattice Dimensions of Austenite and the Beginning of Martensite Transformation in Fe-C Alloys. (In Russian.) V. I. Arkharov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 833-836.

In carbon steels with various C contents, at the temperature of the beginning of martensite transformation, the austenite lattice dimensions are the same—3.607 Å. Therefore, it is concluded that lattice-dimension changes caused by temperature changes are equivalent to those accompanying carbon dissolution, and that the beginning of the martensite transformation corresponds to a critical value of specific volume. (N8, Fe)

106-N. Powder Metallurgy Methods for Research Purposes. Henry H. Hausner. *Sylvania Technologist,* v. 3, Apr. 1950, p. 2-8.

Development of powder-metallurgy processes and how they can be used to solve various metallurgical problems, such as nucleation, self-diffusion, homogenization, and the development of phase diagrams. 12 ref. (N1, N2, M24, H general)

107-N. Measurement of Retained Austenite in Carbon Steels. B. L. Averbach, L. S. Castleman, and M. Cohen. *Transactions of American Society for Metals,* v. 42, 1950, p. 112-119; discussion, p. 119-120.

Previously abstracted from Preprint. See item 4B-94, 1949. (N8, M22, CN)

108-N. The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels. Joseph F. Libsch, Wen-Pin Chuang, and William J. Murphy. *Transactions of American Society for Metals,* v. 42, 1950, p. 121-146; discussion, p. 146-149.

Previously abstracted from Preprint. See item 18B-168, 1949. (N8, J2, AY)

109-N. Preparation of Metal Single Crystals. A. N. Holden. *Transactions of American Society for Metals,* v. 42, 1950, p. 319-346.

Previously abstracted from Preprint. See item 11-318, 1949. (N12)

110-N. Surface Diffusion of Radioactive Silver on Silver. Richard A. Nickerson and Earl R. Parker, *Transactions of American Society for Metals,* v. 42, 1950, p. 376-386.

Rate of diffusion was measured at three temperatures by using radioactive Ag atoms as tracers. Activation energy for self-surface-diffusion was calculated. (N1, Ag)

111-N. A New Theory for the Solid State. Carl A. Zapffe. *Transactions of American Society for Metals,* v. 42, 1950, p. 387-398.

The solid state in general, and for metals in particular, is a condition of aggregation of subcrystalline units of colloidal dimensions, tentatively termed micelles, originating or existing within the previous liquid or gaseous state and carrying aspects of their definition and separateness into the solid state as an inherently discontinuous structure on a colloidal scale. All mechanical physical phenomena depend upon and/or involve intermicellar surfaces and chemical phenomena. 26 ref. (N12)

112-N. Isothermal Temper Embrittlement. Leonard D. Jaffe and Donald C. Buffum. *Transactions of American Society for Metals,* v. 42, 1950, p. 604-614; discussion, p. 614-618.

Previously abstracted from Preprint. See item 18B-169, 1949. (N8, Q23, AY)

113-N. Iron-Manganese and Iron-Manganese-Nickel Alloys. Irvin R. Kramer, Stewart L. Toleman, and Walter T. Haswell. *Transactions of American Society for Metals,* v. 42, 1950, p. 1260-1290; discussion, p. 1290-1294.

Previously abstracted from Preprint. See item 3B-198, 1949. (N8, Q23, Fe)

114-N. Subcritical Isothermal Graphitization. H. A. Schwartz, J. D. Hedberg, and R. Eriksen. *American Foundrymen's Society,* Preprint No. 50-2, 1950, 6 pages.

Shows that rate of secondary graphitization in white cast iron cannot be defined without first defining conditions of an intermediate stage of graphitization during the cooling process. (N8, CI)

115-N. An Introduction to the Annealing of Nodular Iron. J. E. Rehder. *American Foundrymen's Society,* Preprint No. 50-17, 1950, 12 pages.

Time-temperature relationships for the graphitization of primary cementite and of pearlite were determined and results compared with those for white cast irons and blackheart malleable irons. Mechanical properties of bars with varying amounts of pearlite removed. (N8, Q general, CI)

116-N. A New Theory of Recrystallization Nuclei. R. W. Cahn. *Proceedings of the Physical Society,* v. 63, sec. A, Apr. 1, 1950, p. 323-336.

A new theory of nucleus formation when a cold worked metal is annealed is presented. The nuclei are believed to be formed in the most distorted parts of the lattice, in the "local curvatures" postulated by Burgers. A quantitative theory found to be capable of accounting for all the experimental data on nucleation rates is developed. 37 ref. (N2)

117-N. Modification in Aluminium-Silicon Alloys. B. M. Thall and Bruce Chalmers. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 79-97.

During modification of Al-Si alloys by small additions of Na, properties and structure of the alloys are substantially improved. Thermal data on the modified Al-Si alloys were redetermined and semi-quantitative determinations of Na content were made by means of a radioactive technique. Formulation of a new theory of modification based on the influence of Na on the balance of interfacial tensions during solidification. Application of this theory to the mechanism of eutectic solidification. 20 ref. (N12, Al, Si)

118-N. Structural Transformations Resulting From Heat Treatment of Supercooled Manganese-Containing Al-Cu-Mg Alloys. (In German.) K. L. Dreyer and M. Dudek. *Metall,* v. 4, Mar. 1950, p. 87-90.

Results of study of Al alloys containing 4.2% Cu, 0.8% Mg, and 0-1% Mn are illustrated by photomicrographs. The amount of U-phase increases with Mn content above 0.1% and decreases with the heat treating temperature above 500° C. A new type of crystal was identified as the equilibrium phase Al_6Mn. (N9, Al)

119-N. Studies in the Diffusion of Molten Aluminum in Various Kinds of Steel. (In Japanese.) Shin Matsumoto and Torao Kobayashi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 4-9.

Diffusion of Al in carbon and alloy steels and cast iron at 670-800° C. for 1-10 min. was investigated using microscopic examination and hardness tests. Rate of diffusion increased with temperature; but was retarded by increasing concentrations of carbon and by Ni and Fe, and accelerated by Cr. (N1, Al, ST, CI)

120-N. The Promoting Effect of Al and Si on the Graphitization of Chilled Cast Iron. (In Japanese.) Sigeya Sagawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 9-13.

Since the literature did not indicate conclusively which of the above elements is superior for graphitization of cast iron, experiments were made for a range of concentrations up to about 3%. Shows that Al is more effective than Si in all concentrations and that there is a linear relationship between log t (time of graphitization) and % Si or Al. (N8, CI)

121-N. Research on the Influence of Composition and Temperature on the Time of Graphitization of Chilled Cast Iron. (In Japanese.) S. Sagawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 17-21.

Investigated for nine specimens containing various percentages of C and Si. They were held in a molten Pb bath at various constant temperatures, for various periods, then quenched and microscopically examined. (N8, CI)

122-N. Studies on the Changes of Various Properties of Metals and Alloys Due to Twisting. II. (In Japanese.) Nobuo Shiota. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 22-25.

Recrystallization of metals and effects of added elements were studied using the apparatus described in Part I. A wide variety of ferrous and nonferrous metals and alloys was investigated. Two types of recovery were noted. It was found that recrystallization rate of alloys exceeds that of pure metals and is more discontinuous. (N5)

123-N. Studies on the Diffusion of Various Metals in Solid Copper. (In Japanese.) Keizo Niimi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 1-7.

Rates of diffusion of Ni, Sn, Ag, Zn, Si, and Sb, respectively, in solid Cu, were first determined. Then rates of simultaneous diffusion of Ni+Sn, Ag+Zn, and Si+Sb, in Cu, were determined. Microstructures and diffusion-rate constants. 37 ref. (N1, Cu)

124-N. A Note on the Eutectoid Transformation of the Silver-Rich, Beta, Aluminum-Silver Alloys, Based on Microstructural Observations. (In Japanese.) Keizo Niimi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 7-11.

Alloys containing 6.5-10% Al and quenched from the β-range were studied in connection with the heat treatment diagram suggested by Iwase and Takenchi's theory (1941-42). Results indicate that the eutectoid transformation is related to the form of heat treatment. (N9, Ag)

125-N. Studies on the Diffusion of Molten Al Alloys in Carbon Steel. II. Shin Matsumoto and Torao Kobayashi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 11-13.

Results of study for Al-Zn, Al-Cu, and Al-Si alloys containing 2-18% of the second element. Formation of corrosion resistant films by this treatment was studied by means of weight changes. (N1, L15, CN, Al)

126-N. Graphitisation in the Malleable Iron Process. H. G. Hall. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B146-B160.

Previously abstracted from *Foundry Trade Journal.* See item 4B-11, 1949. (N8, CI)

127-N. Electron Microscopic Investigation of the Decomposition of Austenite in the Pearlite-Troostite Region. (In Russian.) V. D. Sadovskii, R. M. Lerinman, and A. M. Polyakova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 299-301.

Investigated for a steel containing 0.41% C, 1.38% Cr, and 3.34% Ni. Electron micrographs of structures resulting from isothermal decomposition at 625, 575, and 550° C. are presented. Analysis of these micrographs indicates that a characteristic laminar structure is formed above and below the temperature of maximum rate of decomposition. Upon decrease of this temperature, thickness and size of the laminations decrease. (N8, M21, AY)

P

PHYSICAL PROPERTIES AND TEST METHODS

128-P. Characteristics of Molybdenum, Titanium and Zirconium. *Industrial Heating,* v. 17, Apr. 1950, p. 684, 686.

Potential value as engineering materials for high-temperature uses. Their principal properties. Table compares characteristics with those of other common metals. (P general, Q general, Mo, Ti, Zr, SG-h)

129-P. The Preparation of Metal Single Crystals for Expansion Measurements. B. G. Childs. *Journal of Scientific Instruments,* v. 27, Apr. 1950, p. 102-103.

Method used to convert a single crystal of tin into spacers, free from strain and recrystallization, for use in an interferometric dilatometer. (P10, Sn)

130-P. Ferromagnetic Resonance Phenomena at Microwave Frequencies. K. J. Standley. *Science Progress*, v. 38, Apr. 1950, p. 231-245.

Surveys available experimental and theoretical material. Need for further experimental and theoretical work. Includes some data on pure metals and alloys. 18 ref. (P16)

131-P. Surfaces of Solids XIX. Molecular Interaction Between Metals and Hydrocarbons. William D. Harkins and E. H. Loeser. *Journal of Chemical Physics*, v. 18, Apr. 1950, p. 556-560.

Energy of interaction between a hydrocarbon and a metal increases rapidly in the order Cu, Ag, Pb, and Fe and with the value of P/P_o. Tables give values of the energy of the vapor at saturation. Values of the work of adhesion at 25° C. for the clean metals are only slightly less than for the oxide-coated metals. The latter increase with decrease of temperature. The method in general use for calculation of work of adhesion from adhesion tension is shown to be absurd, although all of the books on surface chemistry give this method. (P13, Cu, Ag, Pb, Fe)

132-P. Applications of Reaction Kinetics to Metallographic Problems. George-Maria Schwab and George Petroutsos. *Journal of Physical & Colloid Chemistry*, v. 54, Apr. 1950, p. 581-598.

Study of systematic variation of the activation energy of formic-acid-vapor dehydrogenation using Hume-Rothery alloys as catalysts was extended to other types of alloys, for the purpose of obtaining information about the degree of electron saturation of the first Brillouin zone. For this purpose, activation energy was measured in Au-Fe, Fe-C, Au-Sb, Cu-Sb, Cu-Mg, and Au-Pb systems of different compositions. Results are in general agreement with the basic assumptions. Frequency factors confirm the systematic influence of activation energy and lattice type stated previously. 26 ref. (P13, M26, Au, Fe, Sb, Cu, Mg, Pb)

133-P. Average Thermionic Constants of Polycrystalline Tungsten Wires. M. H. Nichols. *Physical Review*, ser. 2, v. 78, Apr. 15, 1950, p. 158-161.

Because of its ability to produce large crystals, the "doped" variety of tungsten wire was used in study of the thermionic properties of single-crystal surfaces of tungsten. In order to determine the effect of impurities, average high-field thermionic constants of polycrystalline doped and undoped tungsten wire were measured. Constants from the doped wire were somewhat lower than those from the undoped wire. Chemical and spectroscopic analyses before and after heat treatment are included. 24 ref. (P15, W)

134-P. Infra-Red Absorption of Silicon. H. Y. Fan and M. Becker. *Physical Review*, ser. 2, v. 78, Apr. 15, 1950, p. 178-179. (P17)

135-P. Some Developments of the Chemistry of Solids, 1912-1947. J. Arvid Hedvall. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 145-157.

Discoveries and development of theories. 24 ref. (P13)

136-P. On the Change of the Resistance of Single-Crystals of Gallium in a Magnetic Field (In English.) J. W. Blom. *Physica*, v. 16, Feb. 1950, p. 144-151.

Presents for single-crystals of Ga, with the shorter crystal axes parallel to the current, rotational diagrams giving increase of resistance in a magnetic field as a function of orientation of the field with respect to the current. (P16, Ga)

137-P. The Kohler Diagram for the Magnetic Increase of the Resistance of Gallium Single Crystals. (In English.) J. W. Blom. *Physica*, v. 16, Feb. 1950, p. 152-170.

On plotting results of measurements on the magnetic increase in resistance of single-crystals of Ga as Kohler diagrams, characteristic functions were found, both for transverse and parallel orientation of the field with respect to the current. This facilitates observation of the results for different temperatures and also enables one to compare the measurements from a number of crystals. For the transverse effect, trivalent Ga corresponds to the bivalent Cd-type and does not resemble that of In. 28 ref. (P16, Ga)

138-P. On the Fourier Analysis of the Magnetic Increase of the Resistance of Gallium; The Fourier Components in the Kohler Diagram. (In English.) J. W. Blom. *Physica*, v. 16, Feb. 1950, p. 171-182. (P16, Ga)

139-P. Thermodynamic Properties of Cobalt Arsenides. (In Russian.) M. I. Kochnev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 21, 1950, p. 433-435.

$CoAs_2$, CoAs, CoAs, Co_2As_2, Co_2As, and Co_3As_2 were studied between 400 and 1095° C. (P12, Co, As)

140-P. Hall Effect for Zinc at Low Temperatures. (In Russian.) E. S. Borovik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 601-603.

Investigated for Zn single crystals at temperatures as low as 4.22° K. Results are charted and compared with those at room temperature. 10 ref. (P15, Zn)

141-P. Preparation of Rhenium Emitters and Measurements of Their Thermionic Properties. Roberto Levi and George A. Espersen. *Physical Review*, ser. 2, v. 78, May 1, 1950, p. 231-234.

Method for electroplating stable rhenium on a tungsten wire. Thermionic-emission properties were investigated and values of work function and of emissivity were obtained. 11 ref. (P17, Re)

142-P. On the Compressibility of Metallic Cesium. R. Sternheimer. *Physical Review*, ser. 2, v. 78, May 1, 1950, p. 235-243.

Volume discontinuity of Cs at 45,000 kg. per sq. cm. is attributed to a shift of the valence electrons from 6*s* zone to the empty 5*d* zones. A Wigner-Seitz calculation for the 6*s* and 5*d* bands supports this explanation. The potentials used are described and tabulated. The possible existence of similar transitions for K and Rb. 18 ref. (P10, Cs)

143-P. Thermoelectromotive Force of Superconducting Versus Normal Junctions of the Same Metal. M. C. Steele. *Physical Review*, ser. 2, v. 78, May 1, 1950, p. 308.

Measurements of temperature variation of thermal e.m.f. of superconducting vs. normal junctions were made for Sn and Pb. (P15, Sn, Pb)

144-P. Photoelectric Effects in Germanium. Bernard J. Rothlein and Frieda A. Stahl. *Sylvania Technologist*, v. 3, Apr. 1950, p. 8-11.

Fundamental principles. (P15, Ge)

145-P. Distribution of Ionization in Materials Irradiated by Two and Three Million-Volt Cathode Rays. J. G. Trump, K. A. Wright, and A. M. Clarke. *Journal of Applied Physics*, v. 21, Apr. 1950, p. 345-348.

Measurements of the depth distribution of ionization in aluminum produced by steady beams of two and three million-volt electrons. Variation of cathode-ray current density in a plane transverse to the beam, effect on this transverse distribution of additional Al scattering foils, and a practical method of cathode-ray dosage. (P15, Al)

146-P. A Null-Coil Pendulum Magnetometer. C. A. Domenicali. *Review of Scientific Instruments*, v. 21, Apr. 1950, p. 327-329.

Null-method magnetometer for measurement of magnetization of small single crystals of polycrystalline specimens of ferromagnetic materials. It may also be used for measurements on paramagnetic and diamagnetic materials. (P16)

147-P. Metallurgical Factors Affecting the Magnetic and Mechanical Properties of Iron-Cobalt Alloys. J. K. Stanley. *Transactions of American Society for Metals*, v. 42, 1950, p. 150-170; discussion, p. 170-174.

Previously abstracted from Preprint. See item 3B-199, 1949. (P16, Q general, Fe, Co)

148-P. Methods of Determining Vapor Pressure of Metals. Rudolph Speiser and H. L. Johnston. *Transactions of American Society for Metals*, v. 42, 1950, p. 283-306; discussion, p. 306-307.

Previously abstracted from Preprint. See item 11-317, 1949. (P12)

149-P. High-Temperature Properties of the Refractory Metals. Earl R. Parker. *Transactions of American Society for Metals*, v. 42, 1950, p. 399-404.

Data collected from a survey of the literature and private sources. Melting points, densities, and known room-temperature mechanical properties are tabulated for 14 metals with the corresponding properties of Fe and Ni for comparison. (P10, P12, Q general, EG-d, SG-h)

150-P. A Quantitative Study of the Domain Structure of Single Crystals of Silicon-Iron by the Powder Pattern Technique. L. F. Bates and F. E. Neale. *Proceedings of the Physical Society*, v. 63, sec. A, Apr. 1, 1950, p. 374-388.

For Mode III magnetization, which occurs when a field acts inside the specimen parallel to the (011) direction, the line deposits formed at right angles to this direction are spaced in good agreement with Néel's theory for the case of wide strips, but in less agreement for narrow strips. Qualitative results of other measurements on strip and disk specimens are reported and interpreted. 15 ref. (P16, Fe)

151-P. A Note on the Theory of Melting. J. K. Mackenzie and N. F. Mott. *Proceedings of the Physical Society*, v. 63, sec. A, Apr. 1, 1950, p. 411-412.

An interesting difference between close-packed metals and substances held together by van der Waals forces—such as the rare gases. (P12)

152-P. Improvements and New Results of Measurement of Variation of Electrical Resistance of Ferromagnetic Substances as a Function of Temperature. (In French.) Georges Mannevy-Tassy. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1150-1152.

Results of experiments performed on Ni at temperatures up to 1297° K. Results are compared with those for other metals by use of a special graphical technique. Fe and Ni

followed the same curve, but MnSb followed a different curve. (P15, Fe, Ni, SG-p)

153-P. The Effect of Thermally Induced Sonic Waves on Plastic Deformation. (In German.) Günther Leibfried. *Zeitschrift für Physik,* v. 127, Mar. 17, 1950, p. 344-356.

Theoretical, mathematical analysis develops relationship between average shear stress produced by sonic waves and melting points of metals. Values for Al, Pd, Cu, Ag, Au, and Pb are tabulated. 10 ref. (P12, Q23)

154-P. Concerning the Statistics of Solid Solutions and of Ferromagnetic Substances. (In German.) Eleonore Trefftz. *Zeitschrift für Physik,* v. 127, Mar. 17, 1950, p. 371-380.

Discusses Bethe-Ising's model for simple cubic, cubic body-centered, and the cubic face-centered lattices. Equilibrium functions for high and low temperatures from which energy and specifc heat may be derived, compared with measured specific heats of Ni, Fe, and brass. 16 ref. (P12, Ni, Fe, Cu)

155-P. Magnetic Properties of Cast Steel. (In German.) Vl. Zednik. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Mar. 1950, p. 65-75.

Magnetic properties are influenced not only by relative amount and kind of alloying elements, but also by carbon content, heat treatment, and grain-boundary impurities. Compares strengths and magnetic properties of different cast steels. (P16, CI)

156-P. Concerning the Ferro-Paramagnetic Transition Range. (In German.) Friedrich Fraunberger. *Zeitscrift für Naturforschung,* v. 5a, Mar. 1950, p. 129-132.

The high-frequency resistance of nickel was measured between 350 and 550° C. In order to study the relationship of the disappearance of spontaneous magnetization to the "skin" effect. Results support the opinion that the paramagnetic Curie point is the true Curie point. 10 ref. (P16, Ni)

157-P. Magnetic Properties of Ferromagnetic Materials at High Temperatures. I. Magnetic Properties of "Senperm" Iron-Silicon-Nickel Alloys in a Weak Field at Various Temperatures. II. Magnetic Properties of Oil-Quenched "Senperm" in a Weak Field at Various Temperatures. (In Japanese.) Tatsuji Yamamoto, Hisayoshi Chiba, and Teijiro Miyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 6-14.

Results show that alloys containing about 10% Si, 16% Ni, and balance Fe (Senperm region) have an abnormal change in their magnetic properties near 300 and 550° C. The abnormality near 300° C. does not exist for Fe-Si-Ni alloys in other than the above region. For the oil-quenched samples, the abnormality shifts to 80 and 30° C., respectively. (P16, Fe, SG-n)

158-P. Developments in Modern Magnet Alloys. Alan Torry and Alun Edwards. *Nickel Bulletin,* v. 23, Mar. 1950, p. 42-46. (P16, SG-n)

159-P. Electrical Properties of Gold-Chromium Alloys. J. O. Linde. *Nature,* v. 165, Apr. 22, 1950, p. 645-646.

Curves show change of resistance with time on aging cold worked specimens containing 21.6 atomic % Cr at different temperatures, also variation of resistance with temperature of the same alloy. (P15, Au, Cr, SG-q)

160-P. Electrochemical Research on Copper-Platinum Alloys (Determination of Potentials and Hydrogen Overvoltages.) (In German.) Brigitte Sarry. *Zeitschrift für anorganische Chemie,* v. 261, Mar. 1950, p. 187-196.

Study made to determine the relationship between the catalytic properties of mixed catalysts and their compositions. Experiments show that the potentials of the alloys (down to about 16.5 at. % Pt) are about the same as that of pure Pt; but that the potential rapidly changes as the Pt content is reduced further. Pt has a similar effect on the overvoltage of hydrogen. 13 ref. (P13, Pt, Cu)

161-P. Aluminum Sulfides, Silicon Sulfides, and the System Al-Si-S. (In German.) E. J. Kohlmeyer and H. W. Retzlaff. *Zeitschrift für anorganische Chemie,* v. 261, Mar. 1950, p. 248-260.

Process for converting molten Al and AlSi alloys entirely or partly into sulfides by passing sulfur vapor through the melts. Includes a study of the thermal properties of the different sulfides. 11 ref. (P12, Al, Si)

162-P. (Book) **Theorie der Supraleitung.** (Theory of Superconductivity.) Ed. 2. Max von Laue. 114 pages. 1949. Springer-Verlag, Berlin, Gottingen, and Heidelberg, Germany.

Latest theories of superconductivity, based on work of the author and other investigators. Includes experimental data and numerous footnote references. (P15)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

267-Q. An Improved Magnesium Alloy. *Iron Age,* v. 165, Apr. 20, 1950, p. 90.

Mechanical properties and aircraft uses of extrusion alloy designated as ZK60, containing 6% Zn and 0.6% Zr. (Q general, T24, Mg)

268-Q. Low Temperature Energy Absorbing Properties of High Tensile Steel Improved by Normalizing. *Steel,* v. 126, Apr. 24, 1950, p. 76.

Results of U. S. Navy experiments showing resistance to brittle-type failures. A striking change in ferritic grain size occurs as a result of normalizing. (Q23, J24, AY)

269-Q. An Investigation of the Weavability of Wire With Observations on the Defects of Wire and Wire Cloth. Parts III and IV. Walston Chubb, Jr. *Wire and Wire Products,* v. 25, Apr. 1950, p. 300-305, 308-10, 329-326; May 1950, p. 407, 410-411, 453.

Various types of steel wire defects which cause trouble during the weaving of wire cloth and screen. Brittleness, uneven color, and uneven temper or stiffness. Investigation of six cases of poor weavability caused by improper annealing and two caused by grain segregation, using the transverse-crimp-sensitivity test previously described and also metallographic examination. Specifications in use and recommended for the different types of steel, monel, and brass wire. Concluding installment: Summary, glossary, bibliography. 85 ref. (Q23, Q5)

270-Q. New Diamond-Indentation Hardness-Testing Method Saves Time and Cuts Costs. Paul Grodzinski. *Instruments,* v. 23, Apr. 1950, p. 343-344. (Q29)

271-Q. A Hydraulic Static Testing Apparatus. J. K. Haviland and G. F. W. McCaffrey. *Aircraft Engineering,* v. 22, Apr. 1950, p. 100-103.

Canadian equipment for strength tests on wings and other large structures. (Q23)

272-Q. Testing a Cycle Frame. *Light Metals,* v. 13, Apr. 1950, p. 175-182.

Methods and results of investigation of dynamic and static properties of an Al-alloy bicycle frame on the test bench and on the road. Includes strain-gage records. (Q25, T10, Al)

273-Q. Metal Buster. *Chemical Industries,* v. 66, Apr. 1950, p. 532.

New creep and stress-rupture equipment of Babcock and Wilcox Co., Alliance, Ohio. (Q3, Q4)

274-Q. Relaxation Methods Applied to Problems of Plastic Flow. I. Notched Bar Under Tension. J. A. Jacobs. *Philosophical Magazine,* ser. 7, v. 41, Apr. 1950, p. 349-361.

Consequences of the Mises-Hencky criterion for plastic strain; the effect of plastic straining is traced by application of a numerical method due to Allen and Southwell. Three problems are considered: two-dimensional slit tension member: a sharp-ended bar under specified edge tractions; and uniform compression of a block between two smooth, rigid plates which do not overlap it. 12 ref. (Q24)

275-Q. Intrinsic Block Structure and the Strength of Metals. M. S. Paterson. *Philosophical Magazine,* ser. 7, v. 41, Apr. 1950, p. 410.

Criticizes recent paper "On the Strength of Quasi-Isotropic Solids", by R. Furth, which discusses the idea of an "intrinsic block structure". Doubts whether mechanical properties of a metal are influenced by the structure proposed by Furth. Fundamental difference between Bragg's and Furth's theories. (Q23, M27)

276-Q. The Elastic Constants of Germanium Single Crystals. W. L. Bond, W. P. Mason, H. J. McSkimin, K. M. Olsen, and G. K. Teal. *Physical Review,* ser. 2, v. 78, Apr. 15, 1950, p. 176.

Data are tabulated. (Q21, Ge)

277-Q. Young's Modulus as a Function of Wire Diameter. George C. Kuczynski. *Nature,* v. 165, Apr. 8, 1950, p. 562-563.

Young's moduli of Cu, Ni, Pt, and W wires of various diameters were determined. For copper, Young's modulus of an annealed wire was found always to be lower than that of the wire of the same radius but in the cold worked condition. Tungsten, because of its elastic isotropy, showed no variation in modulus. Large variations in the modulus of elasticity of some face-centered metals with diameter and heat treatment are due to their elastic anisotropy and changes in their textures. (Q21, Cu, Ni, Pt, W)

278-Q. Effect of Incidental Elements on Carbon-Steel Plates. J. G. Althouse *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 264-277.

Plate steels from all sections of the country with high and low content of incidentals were subjected to tests. Results show trends in mechanical properties as related to incidental content. (Q general, CN)

279-Q. Creep Resistance of Aluminum Alloys. (In French.) Raymond Chevigny and Robert Syre. *Revue de l'Aluminium,* v. 27, Feb. 1950, p. 43-47.

Previously abstracted from *Revue de Métallurgie.* See item 48-Q, 1950. (Q3, Al)

280-Q. Segregation and Strength Properties of a Forging From a 56-Ton Ingot. (In German.) Sepp Ammareller. *Stahl und Eisen,* v. 70, Feb. 16,

1950, p. 125-132; discussion, p. 132-133.

Investigated on a generator rotor of Mn-Mo steel that had been in operation for 3½ yrs., using various metallographic procedures. Effect of segregation was studied by making tensile notch-impact and fatigue tests on specimens cut in radial, tangential, and longitudinal directions to the rotor. 11 ref. (Q23, M21, CN)

281-Q. Instrument for Recording Shrinkage Stress Vs. Temperature Curves of Metals. (In German.) Hans Scholz. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 43-47; discussion, p. 48.

Design, operation, and results. The instrument can be used to study various metallurgical problems, such as the creep resistance of steels. 27 ref. (Q3, Q25)

282-Q. Fatigue Strength and Notch-Effect Factors of Unalloyed and Alloyed Structural Steels at +20 and −78° C. (In German.) Anton Pomp and Max Hempel. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 53-66.

Study was made by testing 36 steels under static, impact, and fatigue stresses. The bars were tested with and without circular V-notches. Testing procedures and results. 24 ref. (Q7, CN, AY)

283-Q. Notch-Impact Toughness and Fatigue Strength of Various Notched and Unnotched Steels Under Tensile Stress. (In German.) Anton Pomp and Max Hempel. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 67-76.

Correlates values reported in the literature for various carbon and alloy steels, showing that there is no generally valid relation between fatigue strength and notch-impact toughness. Results were supplemented with fatigue tests made on notched and unnotched specimens. 46 ref. (Q7, CN, AY)

284-Q. The Effect of Metals on the Coefficient of Friction of Lubricants. (In German.) Hermann Jentzsch. *Erdöl Und Kohle,* v. 3, Mar. 1950, p. 124-127.

A simple and accurate method for determining the above. Typical data are tabulated and charted. (Q9)

285-Q. Periodic Mechanical Properties of the Elements. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 797-799.

Graphs show relationships of mechanical properties of metallic elements (similarly heat treated) to each other, to location in the periodic system, and to atomic structure. (Q general, M25)

286-Q. Systematic Investigation of the Rate and Temperature Dependence of Resistance to Deformation of Single-Phase Metals. (In Russian.) L. D. Sokolov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 839-841.

Investigation for Pb, Sn, and Cu from room temperature up to their respective melting points and for various rates of deformation. (Q23, Pb, Sn, Cu)

287-Q. Chromium Plate Affects Fatigue Limit of Steels. *Product Engineering,* v. 21, May 1950, p. 89.

Results of recent research at National Bureau of Standards. Specimens were machined from three lots of SAE X4130 rod and one lot of 6130 rod. After grinding, polishing, and chromium plating, the specimens were subjected to fatigue tests. In all cases, chromium plating was found to reduce fatigue limits. (Q7, L17, AY)

288-Q. Analysis of Lugs and Shear Pins Made of Aluminum or Steel Alloys. F. P. Cozzone, M. A. Melcon, F. M. Hoblit. *Product Engineering,* v. 21, May 1950, p. 113-117.

Method of stress analysis and procedure for design of lug-pin combinations made of Al or steel alloys. Constructions analyzed include lugs of irregular section and lug-pin combination assemblies having multiple shear connections. (Q25, T7, Al, ST)

289-Q. Trick Metals May Improve Strength of Steels. *Product Engineering,* v. 21, May 1950, p. 138.

Brief and elementary discussion of Andrade's work on single-crystal wires and rods, which have unique properties concerned with slip and twinning. (Q24)

290-Q. High Temperature Testing Machine. *Product Engineering,* v. 21, May 1950, p. 148-149. Condensed from "A High-Speed, High-Temperature Precision Testing Machine for Gas Turbine Disk Research", A. C. Hagg, B. Cametti, and G. O. Sankey, presented before Society for Experimental Stress Analysis.

Gas turbine disk tester for the determination of plastic and creep strains at temperatures up to 1500° F. and rotational speeds up to 35,000 r.p.m. (Q23, Q3, T25)

291-Q. Nature of Fatigue of Metals. R. E. Peterson. *Mechanical Engineering,* v. 72, May 1950, p. 371-375.

See abstract of "Discussions of a Century Ago Concerning the Nature of Fatigue, and Review of Some of the Subsequent Researches Concerning the Mechanism of Fatigue," *ASTM Bulletin,* item 183-Q, 1950. (Q7)

292-Q. Investigations Into the Impact Strength of Iron and Steel. J. D. Fast. *Philips Technical Review,* v. 11, Apr. 1950, p. 303-310.

Deals not only with matters of common knowledge such as execution and significance of the notched-bar impact test and elementary concepts of stress and fracture, but also with original measurements by means of which the impact value of pure iron was determined as a function of temperature, and of oxygen, carbon, and nitrogen content. (Q6, Fe)

293-Q. Stress-Strain and Elongation Graphs for Aluminum-Alloy 75S-T6 Sheet. James A. Miller. *National Advisory Committee for Aeronautics,* Technical Note 2085, Apr. 1950, 37 pages.

Results of tests on duplicate longitudinal and transverse specimens with thicknesses of 0.032, 0.064, and 0.125 in. are plotted. Stress-strain, stress-deviation, tangent-modulus, and auxiliary graphs are plotted on a dimensionless basis. 11 ref. (Q27, Al)

294-Q. The Tensile Impact Properties of Some Metals and Alloys. D. S. Clark and D. S. Wood. *Transactions of American Society for Metals,* v. 42, 1950, p. 45-74.

Results of tests in which force-time relations are determined can be placed on a rational basis through the concept of the theory of plastic strain propagation. Tests were made on ingot iron, carbon steels, alloy steels, stainless steel (Type 302), Cu, Al, Al alloys, Mg alloys, and a Zn die-casting alloy. Influence of different heat treatments on static and tensile impact properties of some steels. Ultimate strength, percentage elongation, and energy absorption under both static and dynamic conditions are plotted for all materials. Advantages and disadvantages of a quench and temper treatment and an austempering treatment. 12 ref. (Q27, CI, CN, AY, SS, Cu, Al, Mg, Zn)

295-Q. Effect of Boron and Kind of Boron Addition Upon the Properties of Steel. R. A. Grange, W. B. Seens, W. S. Holt, and T. M. Garvey. *Transactions of American Society for Metals,* v. 42, 1950, p. 75-105; discussion, p. 105-111.

Previously abstracted from Preprint. See item 3B-196, 1949. (Q general, B22, J26, AY)

296-Q. Formability of Various Alloys for High Temperature Service. John F. Tyrrell. *Transactions of American Society for Metals,* v. 42, 1950, 405-438.

Plastic flow characteristics of 8 Fe, 5 Ni, and 4 Co-base alloys were studied in tensile tests, cup tests, drop-hammer forming, and deep-drawing tests. Results were correlated to give comparative formability ratings. 13 ref. (Q23, GS-h, Fe, Ni, Co)

297-Q. Tensile Properties of a Heat Treated Low Alloy Steel at Subzero Temperatures. E. J. Ripling. *Transactions of American Society for Metals,* v. 42, 1950, p. 439-452; discussion, p. 452-454.

Previously abstracted from Preprint. See item 3B-194, 1949. (Q27, J29, AY)

298-Q. Transverse Ductility Variations in Large Steel Forgings. Edward A. Loria. *Transactions of American Society for Metals,* v. 42, 1950, p. 486-498.

Relation of transverse reduction of area and quality with ingot size and forging reduction. Effect of sulphur. (Q27, F22, ST)

299-Q. A Study With New Equipment of the Effects of Fatigue Stress on the Damping Capacity and Elasticity of Mild Steel. B. J. Lazan. *Transactions of American Society for Metals.* v. 42, 1950, p. 499-549; discussion, p. 549-558.

Previously abstracted from Preprint. See item 3B-204, 1949. (Q7, Q8, CN)

300-Q. Effect of Steady Stress on Fatigue Behavior of Aluminum. J. A. Sauer and D. C. Lemmon. *Transactions of American Society for Metals,* v. 42, 1950, p. 559-575; discussion, p. 575-576.

Previously abstracted from Preprint. See item 3D-65, 1949. (Q7, Al)

301-Q. A Bar Bend Test and Its Application to Stainless Steel. C. A. Zapffe, R. L. Phebus, and F. K. Landgraf. *Transactions of American Society for Metals,* v. 42, 1950, p. 666-684; discussion, p. 684-685.

Previously abstracted from Preprint. See item 9-268, 1949. (Q5, SS)

302-Q. Unnotched Impact Strength of High Speed Steels. Arthur H. Grobe and George A. Roberts. *Transactions of American Society for Metals,* v. 42, 1950, p. 686-707; discussion, p. 707-719.

Previously abstracted from Preprint. See item 3B-195, 1949. (Q6, TS)

303-Q. On the Extrapolation of Short-Time Stress-Rupture Data. Nicholas J. Grant and Albert G. Bucklin. *Transactions of American Society for Metals,* v. 42, 1950, p. 720-751; discussion, p. 751-761.

Previously abstracted from Preprint. See item 3A-197, 1949. (Q4, SS)

304-Q. The Elastic Constants of Uranium. Henry L. Laquer, William E. McGee and Myra F. Kilpatrick. *Transactions of American Society for Metals,* v. 42, 1950, p. 771-784.

Previously abstracted from *U. S.*

Atomic Energy Commission, AECD-2606. See item 42-Q, 1950. (Q21, U)

305-Q. Stability of AISI Alloy Steels at Elevated Temperatures. A. B. Wilder and J. O. Light. *Transactions of American Society for Metals,* v. 42, 1950, p. 917-934; discussion, p. 934.

Previously abstracted from Preprint. See item 3B-200, 1949. (Q6, N8, AY)

306-Q. Creep and Rupture of Several Chromium-Nickel Austenitic Stainless Steels. G. V. Smith, E. J. Dulis, and E. G. Houston. *Transactions of American Society for Metals,* v. 42, 1950, p. 935-978; discussion, p. 978-980.

Previously abstracted from Preprint. See item 3B-202, 1949. (Q3, Q4, M27, SS)

307-Q. The Effect of Sigma Phase on the Short-Time High Temperature Properties of 25 Chromium-20 Nickel Stainless Steel. Glen J. Guarnieri, James Miller, and Frank J. Vawter. *Transactions of American Society of Metals,* v. 42, 1950, p. 981-1000; discussion, p. 1000-1007.

Previously abstracted from Preprint. See item 3B-203, 1949. (Q3, Q27, N8, SS)

308-Q. Influence of Composition on Temper Brittleness in Alloy Steels. A. P. Taber, J. F. Thorlin, and J. F. Wallace. *Transactions of American Society for Metals,* v. 42, 1950, p. 1033-1055; discussion, p. 1055-1056.

Previously abstracted from Preprint. See item 3B-201, 1949. (Q23, J26, AY)

309-Q. Influence of Strain Rate and Temperature on the Creep of Cold Drawn Ingot Iron. William D. Jenkins and Thomas G. Digges. *Transactions of American Society for Metals,* v. 42, 1950, p. 1128-1129; discussion, p. 1129-1130.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 3B-220, 1949. (Q3, Fe)

310-Q. An Evaluation of a Theory for Plastic Flow in Anisotropic Sheet Metals. T. H. Hazlett, A. T. Robinson, and J. E. Dorn. *Transactions of American Society for Metals,* v. 42, 1950, p. 1326-1356.

The theory assumes that strain increments are linear functions of stresses, that work hardening is a function of plastic strain energy, and that kind and degree of anisotropy does not change materially over the ranges of deformations considered. Merits and deficiencies considered by comparing actual stress-strain relationships of Al, Mg, and sheet steel in tension as a function of orientation with those predicted by theory. 17 ref. (Q24, Al, Mg, ST)

311-Q. Improved Test Bars for Standard and Ductile Grades of Cast Iron. Richard A. Flinn and R. Wayne Kraft. *American Foundrymen's Society,* Preprint No. 50-1, 1950, 15 pages.

A series of Y-shaped test blocks was designed to provide sound test bars in a wider range of section sizes (¼-3 in). Comparative tests were made with arbitration bars. (Q27, CI)

312-Q. Some Tests on Relaxation of Cast Iron. V. T. Malcolm and S. Low. *American Foundrymen's Society,* Preprint No. 50-9, 1950, 3 pages.

The tests are convenient for determining the efficacy of stress relief. (Q25,CI)

313-Q. Composition and Properties of Gray Iron. Part I. Richard Schneidewind and R. G. McElwee. *American Foundrymen's Society,* Preprint No. 50-38, 1950, 19 pages.

Re-evaluates Maurer diagram and reduces some of the relationships to a quantitative and readily usable basis. Mathematical expression and graphs to show limiting compositions of C and Si which will cast white. Correlates composition (as measured by carbon equivalent), tensile strength, and section size for sand casting. Equation for predicting tensile strength and its relationship to other mechanical properties. 49 ref. (Q23, E11, CI)

314-Q. Steel Quality as Related to Test Bar Fractures. H. H. Johnson and G. A. Fisher. *American Foundrymen's Society,* Preprint No. 50-41, 1950, 12 pages.

Importance of character of test-bar fractures as an indication of steel quality. Statistical methods were used to demonstrate differences in quality levels. Two general causes of non-cupped fractures were studied (effect of gases and inclusions). Mechanical properties. (Q26, CI)

315-Q. Dilatometer Studies of Nodular Cast Iron. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *American Foundrymen's Society,* Preprint No. 50-62, 1950, 12 pages.

Studies of thermal and mechanical properties of samples taken from a casting composed of progressively thicker cross-sections. 63 ref. (Q23, P11, CI)

316-Q. Correlation of Plastic Deformation During Metal Cutting With Tensile Properties of the Work Material. J. T. Lapsley, Jr., R. C. Grassi, and E. G. Thomsen. *American Society of Mechanical Engineers,* Paper No. 49-A-121, Dec. 1949, 14 pages.

Orthogonal cutting of seamless steel tubing (composition not given) was employed for feeds of 0.0025-0.0085 in. per rev. and positive rake angles of 25-45°. Deformation and forces of cutting were obtained. Results indicate that tensile properties of the work material may offer a useful index to metal cutting performance. (Q23, G17, ST)

317-Q. Influence of Very Low Temperatures on the Hardness of Carbon Steels. Jozef Mazur. *Nature,* v. 165, Apr. 15, 1950, p. 610-611.

Six steels containing 0.10, 0.25, 0.45, 0.75, 0.90, and 1.25% C, respectively, were quenched in brine after holding for 30 min. in a CO atmosphere at 780-960° C. The specimens were then immersed in liquid He for about 3 hr. at 1.5-2.0° K. Hardnesses were determined before heat treatment, after quenching, and after cold treatment. Results show a large decrease in hardness due to cold treatment. (Q29, J26, CN)

318-Q. Surface Effects in the Creep of Cadmium Single Crystals. E. O. Hall. *Nature,* v. 165, Apr. 15, 1950, p. 611-612.

When oxide-coated, single-crystal Cd wires are immersed in an electrolyte such as $CdCl_2$, creep rate is increased many times. However, this rate later decreases, and may stop altogether, due to formation of a crystalline dendrite coating. Electron-microscope investigation showed this material to be $Cd(OH)_2$. Mechanism of the creep effect is proposed. (Q3, R2, Cd)

319-Q. Mechanical Properties of Low-Carbon Molybdenum-Boron Steels. *Alloy Metals Review,* v. 8, Mar. 1950, p. 2-11. Condensed from article of similar title by W. E. Bardgett and L. Reeve.

Previously abstracted from Journal of the Iron and Steel Institute. See item 3B-262, 1949. (Q23, AY)

320-Q. Atomic Displacements Associated With Elasticity in Plastically Deformed Metals. W. A. Wood. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 65-78.

Determination by X-ray diffraction of the magnitude of the internal stresses developed between the grains during plastic deformation of tensile specimens of Fe and Al. In fine-grained specimens, magnitude of the stresses tends to increase in a regular manner with deformation up to a maximum comparable with ultimate stress of the material. However, as grain-size becomes coarser and of the same order of size as the section of the test-piece, intergranular stresses become irregular both in magnitude and direction, and also tend to be smaller. Proposes mechanism other than that which attributes the stresses to mechanical anisotropy of the grains. (Q23, Fe, Al)

321-Q. A Free Cone Bend Test for Aluminium Alloy Sheets and Coils. W. Thompson. *Metallurgia,* v. 41, Apr. 1950, p. 341-345.

Specifications for thin-gage, light-alloy sheets usually call for a bend test instead of an elongation determination as evidence of adequate ductility. Describes a single test for accurate determination of maximum bend radius. (Q5, Al)

322-Q. From a Metallurgist's Notebook: Laundry Springs. H. H. Symonds. *Metal Industry,* v. 76, Apr. 21, 1950, p. 306.

The permanent set encountered in Cu-base laundry-press springs operating in a moisture-laden atmosphere at 200-300° F. was investigated. Compositional and design factors. (Q28, T7, Cu)

323-Q. Influence of Rate of Loading of the Test Machine on Tensile Strength of Cast Iron. Application of Statistical Methods for Interpretation of the Results. (In French.) Jean Gélain. *Fonderie,* Feb. 1950, p. 1933-1939; discussion, p. 1939-1940.

Investigated for 318 specimens of cast iron containing 3.32% C, 1.88% Si, and 0.73% Mn, using three rates of loading. Statistical method used for analysis of the data. (Q27, CI)

324-Q. The Role of Nickel in Cast Copper Alloys. (In French.) J. S. Vanick. *Fonderie,* Feb. 1950, p. 1941-1953; discussion, p. 1953.

Influence of Ni on mechanical properties, resistance to wear, and hardness of various cast Cu alloys. (Q general, Cu)

325-Q. Influence of the Form of Graphite on Internal Friction in Cast Irons. (In French.) Albert Portevin, Robert Cabarat, and Léon Guillet. *Comptes Rendus* (France), v. 230, Mar. 6, 1950, p. 891-892.

Investigated for four different cast irons, using the apparatus developed by Cabarat. The form of the graphite is the principal factor, while the nature of the matrix (ferritic, pearlitic, or mixed) has little effect on internal friction. (Q22, CI)

326-Q. Mechanism Responsible for the Plateau Observed in the Curves of Tensile Strength of Annealed Steels. (In French.) Christian Boulanger. *Comptes Rendus* (France), v. 230, Mar. 13, 1950, p. 1072-1074.

Above phenomenon is discussed in the light of the theory of dislocations. The case of annealed steels is correlated with the general case of cold worked and aged steels which involves a mechanical effect determined by the change in specific volume accompanying the γ-α transformation followed by aging during cooling. (Q23, N7, ST)

327-Q. Electromagnetic Predetermination of Probable Fatigue Limit. (In French.) André Langevin, Emmanuel Paul, and Marcel Reimbert. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1138-1140.

Method for steel based on determination of variation of magnetic permeability as a function of applied tensile stress. Data are charted. (Q7, ST)

328-Q. Effect of Free Surface on Resistance to Deformation of Multicrystalline Materials. (In German.) F. Vitovec and A. Slibar. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 16, Mar. 1950, p. 76-80.

Theoretical discussion of forces that oppose deformation of multicrystalline materials. 24 ref. (Q24)

329-Q. Concerning the Effective Range of Strain Hardening. (In German.) A. Slibar and F. Vitovec. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 16, Mar. 1950, p. 80-84.

Theoretical mathematical analysis of the extent to which crystalline layers surrounding a given grain obstruct slip of this grain. Effects of orientation and distance from the grain of the layers. 20 ref. (Q24)

330-Q. Magnitude of the "Transverse Number" in Plastic Deformation. (In German.) F. Vitovec. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 16, Mar. 1950, p. 85-87.

"Transverse number" (reciprocal of Poisson's ratio) was calculated over the range of plastic deformation on the assumption of no change in volume of the material. Under uniaxial tension, this number increases; and under uniaxial compression, decreases. In either case, transverse number approaches the value 2.0 with decrease in degree of deformation. 10 ref. (Q24)

331-Q. Automatic Load Control for Automatic Testing Machines for Structural Parts. (In German.) August Becker. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 92, Apr. 11, 1950, p. 266-271.

Principles, design, and operation. 21 ref. (Q27)

332-Q. Concerning the Frictional Properties of Metals and Alloys. V and VI. (In Japanese.) Koichi Mizuno. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 13-19.

In Part V, relationships between smoothness of surface and frictional properties were studied for various metals and alloys, including the so-called bearing metals. In Part VI, results of wear tests on carbon steels and cast irons show that wear is proportional to hardness variation of the bearing surfaces. Surface hardness decreases with increasing carbon content. Compares this phenomenon with oxide-film hardness reported in Part II. Proposes a quenching mechanism for the large increase of the hardness of the bearing surfaces of carbon steel under certain conditions. (Q9, SG-c, CI)

333-Q. Some Experiments on the Wear of Metals for the Sewing Machine. (In Japanese.) Syuzi Ando and Tadashi Numazu. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 19-23.

Influence of composition, microstructure, case hardening, and surface roughness of ferrous and nonferrous sewing-machine parts subject to frictional contact was investigated. Results are summarized in English. (Q9, T10, SG-m)

334-Q. Variation of Young's Modulus of Binary Body-Centered Alloys Caused by the Formation of Superlattices. (In Japanese.) Yoshio Shibuya. *Nippon Kinzoku Gakkai-si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 1-6.

Theoretical analysis for the case of CuZn (β-brass), based on the Bragg-Williams approximation. Results thus obtained are compared with experimental ones of Rinehart and of Köster. Fair agreement was found. 20 ref. (Q21, N10)

335-Q. Research on Forging Dies. II. Mechanical Properties at High Temperatures. (In Japanese.) *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 25-27.

Investigation of effects of heat, impact, and abrasion on a series of regular and war-emergency die steels used in Japan. (Q general, T5, AY)

336-Q. The Mechanism of Failure of Case Hardened Steel. I. Relationship of Case Depth and Tensile Properties. II. Relationship of Notch Radius and Tensile Strength. III. Discussion of the Theory of the Mechanism of Failure of Case Hardened Steel. (A New Method for Measuring Technical Cohesive Strength.) (In Japanese.) Hisao Matsumoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 27-32.

Woodvine's fatigue theory is extended to cover the tensile properties of case hardened steel by introducing the concept of technical cohesive strength. Carbon and chromium steels were investigated. Three stages of tensile properties based on case depths were distinguished. Shows that residual stress is due to residual tensile stress in the inner layer and residual compression stress in the case hardened layer. Attempts to extend Woodvine's theory to testpieces with different notch radii. 31 ref. (Q27, J28, CN, AY)

337-Q. Resistance to Wear of Heavily Loaded Gears. (In Russian.) D. S. Kazarnovskii and I. S. Svet. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 20-23.

Causes of breakdown of the smaller gears in tractor transmissions were investigated. Methods of increasing service life of such gears. (Q9, T7, CN)

338-Q. Structural Properties of Modified Cast Irons (Unalloyed, Containing Flaky Graphite.) (In Russian.) *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 34-35.

Table shows physical and mechanical constants of various cast irons under static, impact, and dynamic loading. (Q general, CI)

339-Q. Dependence of Tensile Strength on Duration of Applied Stress for Brittle Fracture. (In Russian.) G. M. Bartenev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 1, 1950, p. 23-26.

On the basis of theoretical considerations and interpretation of formulas proposed by Griffith, the author concludes that "static" fatigue may be explained purely mechanically. Brittle fracture is characterized by two constants: maximum technical tensile strength and "static" fatigue. (Q23, Q7)

340-Q. Vibration of Marine-Turbine Blading. R. W. Nolan. *Transactions of the American Society of Mechanical Engineers*, v. 72, May 1950, p. 439-446.

General explanation of vibration phenomena encountered in turbine design. An apparatus for determining natural frequency of blading, and another for applying both tensile and alternating bending stresses simultaneously. Direct tensile stress is plotted vs. alternating bending stress which causes failure, thus obtaining a curve which shows the resistance to any combination of these stresses. Design stresses for certain turbine blades and the stresses involved in several blade failures are plotted. Magnification factors for two stainless steels at room temperature, and one of them at 750° F., are plotted vs. vibratory bending stress. (Q5, Q27, T25)

341-Q. Stress Distribution Around Spot Welds. A. O. Bergholm, P. W. Swartz, and G. S. Hoell. *Welding Journal*, v. 29, May 1950, p. 217s-223s.

Stresses around spot welds in flat bars of low-carbon steel with two and three weld spots were studied, using special techniques. Results of photo-elastic and Stresscoat enamel studies indicated proper placement of electrical strain gages. (Q25, K3, CN)

342-Q. Test of H-Section Welded Truss. A. T. Waidelich. *Welding Journal*, v. 29, May 1950, p. 252s-258s.

Strain-gage analysis of an 80-ft. truss. Measured stresses and deflections were found to be in close agreement with theoretical values. (Q25, K general, CN)

343-Q. A Review of Information on the Mechanical Properties of Aluminum Alloys at Low Temperatures. K. O. Bogardus, G. W. Stickley, and F. M. Howell. *National Advisory Committee for Aeronautics*, Technical Note 2082, May 1950, 65 pages.

Sources of data (room temperature to temperature of boiling hydrogen) and material to be found in each. General conclusions on alloys used commercially in this country are given. (Q general, Al)

344-Q. Improvement of High-Temperature Properties of Magnesium-Cerium Forging Alloys. K. Grube, J. A. Davis, L. W. Eastwood, C. H. Lorig, and H. C. Cross. *National Advisory Committee for Aeronautics*, Technical Note 2097, May 1950, 42 pages.

Experimental heats were made by addition of a fourth element to the base composition containing 6% Ce and 2% Mn. Tensile properties at 70° and 600° F. were obtained and most compositions were subjected to short time creep tests at 600° F. (Q3, Q4, Mg, SG-h)

345-Q. Meyer Analysis of Metals. D. Hatch and E. J. W. Whittaker. *Nature*, v. 165, Apr. 22, 1950, p. 646-647.

In a recent communication under the above title (v. 164, p. 1129, 1949; see item 90-Q, 1950) Finniston, Jones, and Madsen utilized the two basic equations: $L = ad^n$ and $aD^{n-2} = \text{constant}$, due respectively to Meyer and O'Neill. Outlines some results which show that the second equation may be applicable in some circumstances, but is not generally true. It was found that when a steel ball was pressed into a Pb or In surface, the latter equation fails. (Q29)

346-Q. Notched and Unnotched Fatigue Tests on Flake and Nodular Cast Irons. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Apr. 1950, p. 333-354.

Results for 20 cast irons, including 9 pearlitic and acicular flake graphite irons, 7 Ce-treated nodular irons, and 2 as-cast and annealed Mg-treated nodular irons. Results are compared with other published data. (Q7, CI)

347-Q. Engineering Steels Under Combined Cyclic and Static Stresses. H. J. Gough. *Institution of Mechanical Engineers, Proceedings*, v. 160, no. 4, 1949, p. 417-440.

Previously abstracted from *Engineer*. See item 3B-270, 1949. (Q1, Q5, Q7, ST)

348-Q. The Influence of Stripping Temperature on the Properties of

Pearlitic Grey Cast Iron. *Proceedings of the Institute of British Foundrymen*, v. 42, 1949, p. A61-A73; discussion, p. A73-A77.

Influence on mechanical properties, machinability, microstructure, and distortion. Results indicate that changes in characteristics over a wide range of stripping temperatures are not very marked. Effects on distortion are more complex and need to be determined for each particular casting. Data are tabulated and plotted.
(Q general, E24, G17, M27, CI)

349-Q. Mechanical Properties of Some Copper-Base Alloy Castings. *Proceedings of the Institute of British Foundrymen*, v. 42, 1949, p. A134-A153; discussion, p. A153-A157.

Brief general discussion, and specific information on sand-cast and chill-cast phosphor bronze, leaded and lead-free gunmetals, Al bronze, and high-tensile brasses.
(Q general, Cu)

350-Q. (Book) **The Strength of Wrought Steels at Elevated Temperatures.** R. F. Miller and J. J. Heger. 116 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.25 to members; others $3.00.

Extensive tabular and graphical data cover tensile, creep and rupture properties of standard grades of both carbon and alloy steels. Includes considerable tabular material with rather complete references, also extensive curves and charts.
(Q23, Q3, Q4, CN, AY, SG-h)

351-Q. (Book) **Stress and Strength of Manufactured Parts.** Charles Lipson, G. C. Noll, and L. S. Clock. 259 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 8. $4.50.

Part I deals with basic concepts and of balance between stress and strength. Part II consists of data charts. Specific data pertain only to steel members, but general principles are applicable to other materials. 270 ref. (Q23, ST)

R

CORROSION

160-R. Anodic Oxidation of Ferrochromium in a Caustic Potash Solution. (In French.) Chu Yung-Chao. *Comptes Rendus* (France), v. 230, Jan. 30, 1950, p. 445-447.

Performance of a ferrochromium anode (66.5% Cr, 22.3% Fe, 11.2% C) over a wide range of concentrations of KOH was investigated. Relations between current density, anodic efficiency (% of theoretical yield of potassium chromate based on electrical power consumption), and concentration of the solution. Ranges of concentrations and current densities most suitable for formation of a ferric oxide coating. Compares results with those for caustic soda. Contrary to results reported by Thompson in 1924, anodic efficiency increased with temperature.
(R6, Cr, Fe)

161-R. Radioisotopes Aid Corrosion Research. Jack M. Swartout. *Petroleum Engineer*, v. 22, Apr. 1950, p. C31-C32.

Use at Corrosion Research Laboratory, University of Texas. (R11)

162-R. Corrosion Problems of the Chemical Corps. Jack Furrer. *Armed Forces Chemical Journal*, v. 3, Apr. 1950, p. 24-26.

A few specialized problems in corrosion of steels and Al alloys by chemical-warfare agents and prevention by coatings and other means. (R6, R7, L general, ST, Al)

163-R. Developments in Corrosion Prevention in West Texas. H. D. Murray and W. H Crenshaw. *Oil and Gas Journal*, v. 48, Apr. 27, 1950, p. 166-168.

Methods and materials.
(R general, T28)

164-R. Weathering of Some Aluminium Alloys. *Light Metals*, v. 13, Apr. 1950, p. 215-221.

Experimental and service behavior of 2S, 3S, 50S, and 51S alloys after long exposure to rural, industrial, and maritime atmospheres.
(R3, Al)

165-R. The Dissolution of Metals Over the Temperature Range 25° C. to −60° C. I. The Dissolution of Magnesium in Hydrochloric Acid-Methyl Alcohol-Water Solutions. A. B. Garrett and R. R. Cooper *Journal of Physical & Colloid Chemistry*, v. 54, Apr. 1950, p. 437-444.

Series of investigations is designed to show the general characteristics of the dissolution of metals in HCl from 25 to −60° C. From the data, order of reaction; rate of reaction at various stirring speeds and temperatures; and temperature coefficient of reaction rate (i.e., activation energy) are calculated.
(R5, Mg)

166-R. Orientation of a Polyfunctional Organic Molecule at a Steel Surface. Norman Hackerman and E. E. Glenn, Jr. *Journal of Physical & Colloid Chemistry*, v. 54, Apr. 1950, p. 497-505.

Electron-diffraction, surface-reflection investigation of the adsorption-desorption characteristics of a commercial corrosion inhibitor. It was found that adsorption of this inhibitor was more firm from the more dilute solutions within the range studied. Gradual fading of the arc pattern was noted. A possible mechanism for the phenomena observed is presented. 10 ref. (R10, P13, ST)

167-R. Extra Low Carbon Stainless Steel. Arba Thomas. *Corrosion* (News Section), v. 6, May 1950, p. 1.

Tendency of austenitic stainless steels to intergranular corrosion adjacent to welds. This inherent weakness can be solved by use of Cb or Ti-stabilized grades, but cost is greatly increased. Recommends use of extra-low-carbon Types 304 and 316. (R2, SS)

168-R. Corrosion of Metals by Insecticidal Solutions. George S. Cook and Nancye Dickinson. *Corrosion* (Technical Section), v. 6, May 1950, p. 137-139.

Comparative corrosion resistance of stainless steel, Cu, brass, Al, Mg alloys, Al alloys, cold-rolled steel, and galvanized iron when immersed in various insecticide solutions. Additional tests are suggested.
(R5, R7)

169-R. Potentials Set Up by Thermal Gradients in Iron Immersed in NaCl Solutions. Herbert H. Uhlig and Oscar F. Noss, Jr. *Corrosion* (Technical Section), v. 6, May 1950, p. 140-143.

Laboratory study of cells in which seamless steel tubing electrodes were immersed in NaCl solutions, with one electrode at 100 and the other at 25° C. Results are of importance in connection with numerous common combinations found in industrial equipment. (R5, ST)

170-R. The Value of Backfill With Carbon and Graphite Anodes. J. P. Oliver and W. W. Palmquist. *Corrosion* (Technical Section), v. 6, May 1950, p. 147-150.

Inherent advantages of graphite and carbon anodes for cathodic protection are increased by the proper selection and use of backfill material. Recommends use of carbonaceous backfill. (R10)

171-R. The Installation and Economics of Placing Magnesium Anodes at Leaks Repaired on a Pipe Line. J. A. Holloway. *Corrosion* (Technical Section), v. 6, May 1950, p. 157-161.
(R10, CN, Mg)

172-R. Summary of Discussion: Corrosion and Protection of Offshore Drilling Rigs. F. L. LaQue. *Corrosion* (Technical Section), v. 6, May 1950, p. 161-166.

Discussion at NACE's 5th annual conference, Cincinnati, Apr. 11-14, 1949, on corrosion by sea water.
(R4)

173-R. Corrosion Control in the Cotton Valley Field. Alton J. Carroll. *World Oil*, v. 130, May 1950, p. 141-142, 144, 146.

Use of organic chemical corrosion inhibitors in preventing internal corrosion of oil field equipment.
(R10, T28, ST)

174-R. High-Nickel Alloys Versus Sulphuric Acid. *Industrial Chemist and Chemical Manufacturer*, v. 25, Apr. 1950, p. 155-159.

Resistance of Monel and other high-Ni alloys to H_2SO_4 at various concentrations, temperatures, and degrees of aeration. (R5, Ni)

175-R. Stress Corrosion of Wrought Magnesium Base Alloys. Hugh L. Logan and Harold Hessing. *Journal of Research of the National Bureau of Standards*, v. 44, Mar. 1950, p. 233-243.

In order to determine effect of tensile stress on behavior of Mg alloys exposed to corrosive media, stress-corrosion tests were made on several of them at two outdoor-exposure sites, and in the laboratory by continuous immersion in a NaCl + K_2CrO_4 solution and by intermittent immersion in a dilute NaCl solution. Predictions of relative susceptibility to stress-corrosion from intermittent immersion laboratory tests in a 0.01% NaCl solution were in good agreement with results obtained from outdoor-exposure tests.
(R1, Mg)

176-R. Soil-Corrosion Studies, 1946 and 1948: Copper Alloys, Lead, and Zinc. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards*, v. 44, Mar. 1950, p. 259-289.

Results of measurements of the corrosion of Cu, Pb, and Zn, and of certain alloys of these metals, after exposure to different soil conditions for a maximum of 14 years. Magnitude and progress of corrosion with respect to weight loss and pitting are interpreted in relation to composition of the materials and properties of the soils. Comparative data for the corrosion of plain iron and steel, Cu, Pb, and Zn in typical soil environments. 10 ref.
(R8, Cu, Pb, Zn)

177-R. Corrosion Resistance of Tantalum-Molybdenum Alloys. Walter C. Schumb, Schrade F. Radtke, and Michael B. Bever. *Industrial and Engineering Chemistry*, v. 42, May 1950, p. 826-829.

A series of alloys from 0 to 100 atomic % Ta in 10 atomic % steps was prepared by arc fusion of sintered compacts in an argon atmosphere. Resulting ingots were accurately cut, ground, and polished, and the surface of each sample estimated. Density, hardness, and other properties were determined. Corrosion resistance at 50° C. in solutions of concentrated HCl, HNO_3, and H_2SO_4 was determined. Ta-rich specimens were found to be unattacked, whereas the Mo-rich alloys were attacked at increasing rate in the order H_2SO_4, HCl, HNO_3.
(R5, Ta, Mo)

178-R. Corrosion and Chemical Testing of Waters for Subsurface Injection. Parts II and III. (Concluded.) J. Wade Watkins. *Producers Monthly*, v. 14, Mar. 1950, p. 30-31; Apr. 1950, p. 25-31.

Determination of dissolved oxygen, free CO_2, pH value, total and dissolved Fe, alkalinity, and carbonate stability. 20 ref. (R4)

179-R. Preferred Orientation as a Factor in Intergranular Corrosion. W. D. Robertson. *Journal of Metals*, v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 790-791.

Several recent, independent studies, in combination with available X-ray data indicate that there may be a direct correlation between relative orientation of contiguous grains and susceptibility to intergranular corrosion. Present note shows the nature of the correlation and suggests a few critical experiments by means of which the role of structure can be further clarified. (R2, M27)

180-R. Corrosion of Metals Underground. *Technical News Bulletin* (National Bureau of Standards), v. 34, Apr. 1950, p. 48-49; *Products Finishing*, v. 14, May 1950, p. 18, 20, 22, 24.

Based on recent papers by I. A. Denison and M. Romanoff, *Journal of Research of the National Bureau of Standards*. See items 100-R and 176-R, 1950. (R8, Cu, Pb, Zn)

181-R. The High Temperature Oxidation of Manganese. Raymond S. Gurnick and William M. Baldwin, Jr. *Transactions of American Society for Metals*, v. 42, 1950, p. 308-318.

Previously abstracted from Preprint. See item 6C-68, 1949. (R2, Mn)

182-R. An X-Ray Study of the Scale Formed on Iron Between 400 and 700° C. O. A. Tesche. *Transactions of American Society for Metals*, v. 42, 1950, p. 641-648; discussion, p. 648-652.

Previously abstracted from Preprint. See item 6B-147, 1949. (R2, M27, Fe)

183-R. Stress Corrosion in a Stainless Steel Compressor. Frank W. Davis. *Transactions of American Society for Metals*, v. 42, 1950, p. 1233-1250; discussion, p. 1251-1259.

Previously abstracted from Preprint. See item 6B-148, 1949. (R1, SS)

184-R. Corrosion Tests for Soluble Oil Dispersions. *Journal of the Institute of Petroleum*, v. 36, Mar. 1950, p. 148-163.

Comprehensive description of experimental work of Cutting Oil Panel of Standardization Sub-Committee No. 6 on Lubricants of the Institute of Petroleum. (R7, G21)

185-R. Structure of Stearic Acid Films on Copper. J. A. Spink. *Nature*, v. 165, Apr. 15, 1950, p. 612-613.

Brummage recently questioned the author's conclusions on the above. The criticism was based mainly on the observation that almost all long-chain compounds give similar electron-diffraction transmission patterns. Admits validity of this criticism, but shows that arc patterns obtained from rubbed films of stearic acid on stainless steel differ fundamentally from those of the acid heated on copper. (R2, Cu)

186-R. Corrosion of Cadmium and Zinc Coatings in Electrical Equipment. P. T. Gilbert and S. E. Hadden. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950 p. 41-49. (Preprint.)

Tests to determine behavior at room temperature and 60° in humid atmosphere in the presence and absence of various insulating materials. Results indicate that Cd should give adequate protection to steel components. (R3, T1, Cd, Zn, ST)

187-R. The Corrosion of the Austenitic Stainless Steels. Part III. Stress Corrosion. G. T. Colegate. *Metallurgia*, v. 41, Apr. 1950, p. 305-308.

Effects of stress corrosion, modified compositions, and atmospheric exposure. (R1, SS)

188-R. Corrosion Problems in Powder Metallurgy. (In German.) H. Grubitsch. *Werkstoffe und Korrosion*, v. 1, Mar. 1950, p. 89-93.

The corrosive properties of sintered bodies or powders differ from those of cast metals. Sintered articles are primarily corroded by galvanic action induced by cold working or by various external factors. Methods of reducing the rate of corrosion. 35 ref. (R1, H general)

189-R. Relationship of Metal Weight Loss to Absorption. (In German.) K. Wickert and J. Kroll. *Werkstoffe und Korrosion*, v. 1, Mar. 1950, p. 105.

Refers to weight-loss due to absorption. Experiments on CO_2 absorption by $Fe(OH)_3$ show that such absorption greatly affects the rate of corrosion of iron and steel. Tests were made with uncoated sheet iron and with sheet iron coated with "A-carbon" and with $Fe(OH)_3$ suspended in water containing CO_2 or O_2. (R5, Fe)

190-R. The Solubility of Iron in Hydrochloric Acid During the First Few Seconds. (In German.) K. Wickert, E. Böhnert, and H. Pilz. *Werkstoffe und Korrosion*, v. 1, Mar. 1950, p. 106-107.

Object of the study was to determine effects of an inhibitor (hexamethylene-tetramine) on the above. (R5, Fe)

191-R. Behavior of Materials in Contact With Steam at Temperatures Up to 600° C. (In German.) G. Bandel and H. J. Wiester. *Brennstoff-Warme-Kraft*, v. 1, Nov. 1949, p. 203-208.

Results indicate that although increased steam pressure and temperature reduce the relative fuel consumption of power plants, they also reduce life of the steam turbine. Tests were made to determine the high-temperature properties of highly alloyed austenitic steels. 16 ref. (R4, AY, SG-h)

192-R. Research on Corrosion of Electrodeposits by Different Solutions. (In Japanese.) Tadayoshi Inui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 31-35.

The corrosion resistance of Ni, Cu, Cu-Ni, Zn, and Ag electrodeposits, also of solder and of phosphate coating, were determined in distilled water, NaCl, Bordeaux mixture, formaldehyde, DDT, formic acid, and sodium arsenite. (R5, Ni, Cu, Zn, Ag)

193-R. Studies on the Corrosion of Tin. V. (In Japanese.) H. Endo and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 36-39.

Corrosion in H_3PO_4, CH_3COOH, NaOH, and some neutral-salt solutions. (R5, Sn)

194-R. — Studies on the Oxidation of Metals. II. Conditions for Formation of Powdered Oxide on the Surface of Iron. (In Japanese.) Yasumitsu Shimomura. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 16-17.

Conclusions derived in the first report were applied to new experiments and an empirical equation developed for conditions of formation of powdered iron oxide, based on heating temperature and time to formation. Also proposes a generalized equation applicable to all metals and alloys oxidized by the same mechanism as iron. (R2, Fe)

195-R. Corrosion of High-Cr Stainless Steel in an Acidic Mist. (In Japanese.) H. Endo, A. Itagaki, and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 32-33.

Corrosion of 18, 25, and 30% Cr stainless steels in a mist of 10% H_2SO_4 and influence of small amounts of Ni, Mo, and Ni + Mo were investigated. (R5, SS)

196-R. The Tarnish-Resisting Silver Alloys. II. (In Japanese.) Masazo Okamoto and Tomojiro Tottori. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 34-36.

Ag alloys containing 1-6% Zn, Sn, Al, or Cd were investigated. Addition of 4-6% Sn or Zn was found to be very beneficial. Also, an oxide film rich in alumina formed by preferential oxidation of Al-containing Ag alloys was found to be corrosion resistant. Solid solubility of Be and Si in Ag was also determined. (R2, N12, Ag)

197-R. Corrosion of Diesel Cylinder Liners. F. N. Speller and F. L. LaQue. *Railway Mechanical and Electrical Engineer*, v. 124, May 1950, p. 258-261. A condensation.

Peculiar type of attack frequently encountered on the water side. Experiments indicate its cause to be cavitation-erosion caused by high-frequency vibration. However, an element of electrochemical corrosion apparently exists, since chromate inhibitors and use of austenitic cast iron (Ni-Resist) are somewhat effective in service, although not in laboratory testing where pure cavitation-erosion can be produced. Recommends practical steps for minimizing attack. Also discusses ordinary corrosion of diesel liners and its prevention. (R1, T25, ST, CI)

198-R. A Kinetic Study of Organic Inhibitors of the Reaction Between Magnesium and Acids. R. Hurst and M. A. Jermyn. *Journal of the Chemical Society*, Jan. 1950, p. 158-162.

Inhibition of metal-acid reactions by organic substances and simplified methods for studying the kinetics of such inhibitions. Dissolution of Mg by acids was found to be inhibited by organic amines. Various reaction-rate constants were determined. The relation between inhibitor concentration and degree of inhibition was found to be that expected for an adsorption process. Effectiveness of the inhibitor depends on steric factors—shape and size of its molecule regarded as adsorbed on the metal surface at an active point. (R10, Mg)

199-R. Corrosion Fatigue as an Intracrystalline Corrosion Effect. (In German.) Franz Lihl. *Metall*, v. 4, Apr. 1950, p. 130-131.

X-ray studies showed that the etching of ingot iron with acid results in formation of surface stresses which can be relieved, but not eliminated, by extended annealing followed by slow cooling. Mechanism is explained on the basis of test results. (R1, Fe)

200-R. Corrosion of Metals by Cracked Gasoline and Other Unsaturated Fuels. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 361-363.

Study of the problem indicates that auto-oxidation is the cause of corrosion by gasoline. Data on corrosion of Zn, Cu, and Pb are charted Methods of prevention. (R7, Zn, Cu, Pb)

201-R. Study for Development of New Stabilized High Strength Aluminum Alloys, Final Report. E. H. Kinelski. *Cornell Aeronautical Laboratory,* Report No. KA-496-M-4, June 1949, 64 pages.

Intergranular corrosion stabilization of 24S-type Al alloy. Reviews literature research and describes development of a micro solution-potential measuring technique, and experimental investigation of effect of various elements on electro-solution potential. 40 ref. (R2, R11, Al)

202-R. (Book) **Thermodynamics of Dilute Aqueous Solutions With Applications to Electrochemistry and Corrosion.** M. J. N. Pourbaix. 136 pages. 1949. Longmans, Green and Co., 55 Fifth Ave., New York. $5.50.

This monograph develops a general method for calculation of equilibrium conditions in reactions in dilute aqueous solutions. Methods whereby such equilibria can be expressed graphically are also explained and examples of their application given. Based on 1946 French edition. 130 ref. (R5)

S

INSPECTION AND CONTROL

174-S. Radon—Its Place in Non-Destructive Testing. V. E. Pullin. *Welding,* v. 18, Apr. 1950, p. 166-169.

Procedures and equipment. (S13)

175-S. Gamma Radiography. *Atomics,* v. 1, Apr. 1950, p. 108-112.

An illustrated survey of procedures and applications to nondestructive inspection of metallic parts. (S13)

176-S. How To Control Powder Part Size. E. E. Ensign and I. A. DeGrote. *Iron Age,* v. 165, Apr. 20, 1950, p. 83-86.

Mass production of a powdered-metal distributor bushing at Ford Motor Co. demanded precise control of tolerances. Rejections were cut about 90% after statistical quality control was put in operation. Clarified by graphs. (S12, H general)

177-S. How GE Buys Powder Parts. J. D. Carey and A. G. Pison. *Iron Age,* v. 165, Apr. 20, 1950, p. 95-97.

Special test procedures used to maintain quality in powdered-metal parts purchased from vendors. Accelerated and statistical quality-control tests are applied. (S2, H general)

178-S. New Tinplate Coating Thickness Meter. *Iron Age,* v. 165, Apr. 20, 1950, p. 99.

Meter which continuously indicates and records tin-coating thickness on steel strip during electroplating. (S14, L17, Sn, ST)

179-S. Rapid Photometric Determination of Iron in High Temperature Alloys. Michael Stevens Pepi. *Analytical Chemistry,* v. 22, Apr. 1950, p. 560-561.

Method is based on reaction of ferrous ion with 1,10-phenanthroline. Reproducibility is good and average error is ±0.02% of the amount present. (S11, Fe, SG-h)

180-S. Magnetic Particle Inspection in the Oil Industry. George L. C. Dehn. *Drilling Contractor,* v. 6, Apr. 15, 1950, p. 65-68.

Miscellaneous applications to equipment. (S13, T28)

181-S. A Proportional Reset Furnace Controller for Temperatures up to 1600° C. R. W. Nurse and J. H. Welch. *Journal of Scientific Instruments,* v. 27, Apr. 1950, p. 97-99.

Controller which will regulate temperature within ±¼° C. (S16)

182-S. Sonic Tests Spot Flaws in Heavy Forgings. Robert W. Snowdon. *Iron Age,* v. 165, Apr. 27, 1950, p. 88-90.

Second and concluding installment describes sonic testing of irregular shapes, which requires special techniques and equipment. Procedures for eccentric cranks and drill collars (Concluded.) (S13, CN)

183-S. Quality Control Lowers Costs; Boosts Production. Nelson G. Meagley. *Iron Age,* v. 165, Apr. 27, 1950, p. 91-94.

Details of chart methods used by Willys-Overland Motors, Toledo, Ohio. (S12)

184-S. Inspection and Classification of Metals Made Easy. B. M. Smith. *Iron Age,* v. 165, Apr. 27, 1950, p. 95-98.

How use of the GE metals comparator has been broadened through development of a new test head. Large parts may be inspected nondestructively, and mixed lots of metals separated. The device is used for close control of composition, heat treatment, hardness, case depth, and plating thickness. (S10, S14, J28, L17)

185-S. Tentative Specifications for Automotive Gray Iron Castings: ASTM Designation: A 159—49T. *Foundry,* v. 78, May 1950, p. 177-178. (S22, CI)

186-S. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part I. Theory and Literature Review of Free Cyanide Determination. Samuel Heiman. *Plating,* v. 37, May 1950, p. 476-481.

43 references. (S11, L17, Cu)

187-S. Determination of Impurities in Electroplating Solutions. XIX. Traces of Nickel in Copper Plating Baths. Earl J. Serfass, W. S. Levine, P. J. Prang, Mary H. Perry, and R. B. Freeman. *Plating,* v. 37, May 1950, p. 495-499.

Reviews literature and describes colorimetric method developed. 23 ref. (S11, L17, Ni, Cu)

188-S. Growing Number of Metal Drums Makes Knowing "Specs" a Shipper's "Must". T. Pat Callahan. *Chemical Industries,* v. 66, Apr. 1950, p. 582, 584.

Specifications for alloy types and designs required for shipment and storage of various industrial chemicals. (S22, T29, SG-g)

189-S. Temperatures of Liquid Iron and Steel in Practice. T. B. Winkler. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 11-23.

Previously abstracted under similar title from *Blast Furnace and Steel Plant.* See item 13-39, 1949. (S16, D2, ST)

190-S. A Bath-Temperature Pyrometer. J. A. Warchol. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 162-167; discussion, p. 167.

Experiments with the Leeds and Northrup immersion pyrometer which employs the radiation principle and is used in determining temperature of molten steel. (S16, ST)

191-S. Reduction of Zirconium and Thorium by Means of the Dropping Mercury Cathode. (In Italian.) Danilo Cozzi. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 57-68.

A polarographic study of reduction of $ZrOCl_2$ and $ThCl_4$ in KCl solution. Reduction is performed in the presence of methylene blue. (S11, Zr, Th)

192-S. From a Metallurgist's Notebook: Propeller Bronzes. H. H. Symonds. *Metal Industry,* v. 76, Apr. 14, 1950, p. 289-290.

Concerned with the failure of ships' propellers. Examination of the samples submitted showed that, because the cooling rate was too high, thus suppressing alpha separation, the structure was wholly beta and therefore inclined to be brittle. (S21, N9, Q general, Cu)

193-S. Spectrochemical Analysis of Steels, Cast Irons, and Zinc. (In French.) A. Hannick and A. Hans. *Revue de Metallurgie,* v. 47, Feb. 1950, p. 134-138.

Precision, rapidity, and sensitivity of this method for determination of residual and added elements in concentrations between 0.0006 and 5.0%. (S11, ST, CI, Zn)

194-S. Method of Quantitative X-Ray Analysis of Allotropic Modifications of Cobalt. (In French.) M. Sage and Ch. Guillaud. *Revue de Métallurgie,* v. 47, Feb. 1950, p. 139-144; discussion, p. 144-145.

Theory and practical application. (S11, Co)

195-S. A New Wall-Thickness Meter for Ferromagnetic Materials. (In German.) Rudolf Berthold. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 233-234.

Calibration curves and typical data. (S14)

196-S. Automatic Photoelectric Pyrometer. (In Russian.) E. G. Ruttera, N. P. Chizhova, V. A. Savel'eva, L. V. Kuznetsova, and V. L. Aizenshtoka. *Promyshlennaya Energetika* (Industrial Power), v. 7, Jan. 1950, p. 13-14.

Circuit diagram of pyrometer developed especially for use during cooling of high speed steel. (S16, TS)

197-S. Faster Inspection of Connecting Rods. C. J. Moody. *Automotive Industries,* v. 102, May 1, 1950, p. 33, 82.

Former practice for Ford connecting-rod forgings involved pickling to remove scale and rust prior to individual-piece inspection for defects such as forging laps, heat treat cracks, etc. Present procedure consists of shot blasting followed by automatic fluorescent magnetic-particle inspection. Besides releasing at least five men, endurance limit is increased by the shot blasting. (S13, T21, ST)

198-S. Quick Inspection Method for Engine Parts. Rebecca H. Smith. *Automotive Industries,* v. 102, May 1, 1950, p. 46-47, 90.

Dye Penetrant Method (DPM) developed at Turbodyne Corp., for inspection of gas-turbine parts in a variety of ferrous and nonferrous alloys. (S13, T25)

199-S. Warpage and Cross-Bending Tests as Criteria of Resistance of Enamels Under Stress in Service. D. R. Goetchius and E. E. Bryant. *Journal of the American Ceramic Society,* v. 33, May 1, 1950, p. 149-151.

Various commercial finish-coat enamels of widely different compositions were evaluated using the above test. Values obtained were compared with known service data. Working ranges of these values that meet specific requirements are indicated. (S21, L27)

200-S. Oil Powder Method of Flaw Detection. *Industry & Welding,* v. 23, May 1950, p. 27, 76-77.

New method developed by the Navy. (S13)

201-S. INCO Writes Specs for Ductile Iron. A. P. Gagnebin. *Iron Age,* v. 165, May 4, 1950, p. 89.

To date, no standard specifications have been established as a basis for purchase. International Nickel

Co. suggests a set based on physical properties desired in various applications. (S22, CI)

202-S. The Use of Briquetted Samples in the Spectrochemical Analysis of Carbon and Alloy Steels and Other Metals. J. F. Woodruff. *Journal of the Optical Society of America*, v. 40, Apr. 1950, p. 192-196.

Briquetted-sample techniques for routine analysis of steel, zinc, and Zn-base alloys. Low and plain carbon steels are analyzed quantitatively for such elements as Sn, Pb, Mn, Ni, Cr, Mo, Co, Ti, Al, Zn, and B. Zn and Zn-base alloys are analyzed quantitatively for Cd, Fe, Pb, Sn, Sb, and Al. Operational details and precision and accuracy over a five-year period. 13 ref. (S11, CN, AY, Zn)

203-S. The Theory of Sampling Inspection Plans. H. C. Hamaker. *Philips Technical Review*, v. 11, Mar. 1950, p. 260-270.

Systematic analysis of different sampling-inspection systems. (S12)

204-S. Statistical Methods for Evaluating the Quality of Certain Wrought Steel Products. Edwin G. Olds and Cyril Wells. *Transactions of American Society for Metals*, v. 42, 1950, p. 845-890; discussion, p. 891-899.

Previously abstracted from Preprint. See item 12-186, 1949. (S12, ST)

205-S. Determination of Oxygen in Metals by the Vacuum-Fusion Method. R. K. McGeary, J. K. Stanley and T. D. Yensen. *Transactions of American Society for Metals*, v. 42, 1950, p. 900-913; discussion, p. 913-916.

Previously abstracted from Preprint. See item 10A-130, 1949. (S11)

206-S. The Tungsten-Iridium Thermocouple for Very High Temperatures. Walter C. Troy and Gary Steven. *Transactions of American Society for Metals*, v. 42, 1950, p. 1131-1149; discussion, p. 1150-1160.

Previously abstracted from Preprint. See item 13-58, 1949. (S16)

207-S. The Use of the Spectroscope in the Steel Industry. E. O. Waltz. *American Iron and Steel Institute Yearbook*, Preprint, 1950, 10 pages.

Methods used on production samples. Man-hour reduction, more heats per day, time saved on open-hearth, and limited use for some other elements. (S11, ST)

208-S. Metal Composition Tests for the Steel Melter. H. H. Fairfield, H. F. Graham and A. E. McMeekin. *American Foundrymen's Society*, Preprint No. 50-30, 1950, 6 pages.

Tests using hardenability properties for estimating the composition of carbon steels in less than 2 min. (S11, CN)

209-S. A Simple Instrument for Measuring "Surface Truth" of Metal Surfaces and the Amount of Polishing Required. G. E. Gardam. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950. (Advance Copy No. 4, 8 pages.)

(S15, L10)

210-S. Measurements and Measuring Methods for Quantity Inspection of Small Size Precision. Alwin Meier. *Microtechnic*, v. 4, Jan.-Feb. 1950, p. 13-27. Translated from the French.

Methods used in production of watch parts. (S14)

211-S. Notes on the Spectrophotometric Determination of Copper as Diethyldithiocarbamate. (In English.) T. C. J. Ovenston and C. A. Parker. *Analytica Chimica Acta*, v. 4, Apr. 1950, p. 135-141.

14 references. (S11, Cu)

212-S. Notes on the Spectrophotometric Determination of Cobalt and Nickel in the Microgram Range. (In English.) T. C. J. Ovenston and C. A. Parker. *Analytica Chimica Acta*, v. 4, Apr. 1950, p. 142-152.

10 references. (S11, Co, Ni)

213-S. Polarographic Determination of the Impurities Fe, Cu, Cd, Zn, Sb, and Zn in Refined Lead. (In German.) D. Cozzi. *Analytica Chimica Acta*, v. 4, Apr. 1950, p. 204-210.

(S11, Pb)

214-S. Critical Cold Working Properties of Cr-Mo-Si Superheater-Tube Steels. (In German.) W. Mielentz. *Brennstoff-Warme-Kraft*, v. 2, Jan. 1950, p. 9-13.

Fundamental study of service failures. Low-alloy steels or those with radial structures were not appreciably susceptible to such failures, in contrast with steels having clearcut granular structures. (S21, T25, AY)

215-S. Concerning Causes of Failure of Bucket Cranes of 5000 Kg. Lifting Capacity. (In Russian.) M. M. Kobrin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 23-25.

Includes micrographs, macrographs, mechanical properties, and chemical compositions of the failed metal. (S21, T5, CN)

216-S. Radioisotopes Serve Metallurgy. *SAE Journal*, v. 58, May 1950, p. 43-45. Based on "Radioactive Tracers for Detection of Submicroscopic Quantities of Material Transfer", by R. A. James; "Industrial Application of Radioisotopes", by William Reid; and "Radioisotopes", by Keith Symon. (S19)

217-S. Radiation Pyrometer for Lower Temperatures. Sam Tour. *Iron Age*, v. 165, May 18 1950, p. 90-93.

Equipment by which tinplate temperatures between 180 and 400° F. can be measured. Accurate measurements can be taken as close as 18 in. from the heated strip. Development required investigations of radiation theory and studies of the limitations of previous instruments. (S16)

218-S. Determination of Impurities in Inert Gases. R. E. Bowman and C. B. Hartley. *Welding Journal*, v. 29, May 1950, p. 258s-262s.

Equipment and techniques for determining impurities in A and He, used in arc welding. The method is based on the fact that molten Li absorbs N_2, O_2, and water vapor. (S11, K1)

219-S. From a Metallurgist's Notebook: Defective Safety Pins. H. H. Symonds. *Metal Industry*, v. 76, Apr. 28, 1950, p. 327-328.

Investigation of failures in the caps of Ni-plated brass safety pins. Microstructural examination indicated that stress-corrosion cracking was the primary cause of failure. Plating conditions were contributory causes. (S21, R1, L17, Cu, Ni)

220-S. Hot-Extraction Method of Gas Analysis as Applied to Cast Iron. J. E. Hurst and R. V. Riley. *Proceedings of the Institute of British Foundrymen*, v. 42, 1949, p. A185-A188; discussion, p. A189-A191.

Previously abstracted from "Gases in Cast Iron", *Foundry Trade Journal*. See item 10B-81, 1949. (S11, CI)

221-S. (Book) **An Index of Nomograms.** Douglas P. Adams, compiler. 174 pages. 1950. Technology Press, Massachusetts Institute of Technology, Cambridge, Mass.; and John Wiley & Sons, 440 Fourth Ave., New York 16, $4.00.

Lists references to 1700 published nomograms by subject. Covers all major fields of science and technology from mathematics and physics; welding, metals, and machine design; to medicine and food. Indicates variables employed in each. (S22)

T

APPLICATIONS OF METALS IN EQUIPMENT

223-T. Indianapolis Race Car Has Sheet Aluminum Frame. R. Raymond Kay. *Automotive Industries*, v. 102, Apr. 15, 1950, p. 36, 102, 104.

(T21, Al)

224-T. Aluminum Foil Proves Practical for Packaging. Joseph Geschelin. *Automotive Industries*, v. 102, Apr. 15, 1950, p. 41, 110, 112.

Use for packaging finely machined automotive parts at extremely low cost and with excellent protection against corrosion in transit as well as on the shelf. (T7, Al)

225-T. Powder Parts Add Up. Peter Mondy. *Iron Age*, v. 165, Apr. 20, 1950, p. 80-82.

Use of powdered-metal parts made to very close tolerances by Burroughs Adding Machine Co. to replace parts made by conventional methods. Precision to 0.001 in. is not uncommon and no further machining is needed. Materials include bronze. (T10, H general, Cu)

226-T. Powder Magnets Replace Latch. *Iron Age*, v. 165, Apr. 20, 1950, p. 97.

Use of Alnico magnets in refrigerator door-closing device. (T7, H general, SG-n)

227-T. Aluminum in Road Transport. *Light Metals*, v. 13, Mar. 1950, p. 160-165; Apr. 1950, p. 186-191.

Proceedings of symposium of Aluminium Development Association held on Feb. 14, 1950 in England. (T21, Al)

228-T. A Modern Metallic Yarn. *Light Metals*, v. 13, Apr. 1950, p. 192-194.

Al-foil + plastic laminate produced in the U. S. Because of its nontarnishing qualities it is particularly suitable for dress fabrics and for furnishings. (T10, Al)

229-T. The Developing Uses of Light Alloys for Boat Building. G. L. R. Watkins. *Light Metals*, v. 13, Apr. 1950, p. 206-214.

(T22, Al, Mg)

230-T. Metal-Base Permanent Lubricant. *Aviation Week*, v. 52, May 1, 1950, p. 39.

Properties of colloidal solution of molybdenum, for use alone or as additive which resists high temperatures and pressures. (T29, Mo)

231-T. The Shadelite Marquee. *Modern Metals*, v. 6, Apr. 1950, p. 21-22.

Unique aluminum awning, which resembles a horizontal venetian blind. Made of 6-ft. lengths of 61S-T Alclad, it allows glare-free light to pass, but catches rain and snow in troughs which carry it to downspouts. (T26, Al)

232-T. Canada's First Aluminum Bridge: A Preview of Things To Come? *Modern Metals*, v. 6, Apr. 1950, p. 24-26.

(T26, Al)

233-T. Fifty-Two Years of Electrical Conductors for Power Transmission. Robert F. McGeever. *Modern Metals*, v. 6, Apr. 1950, p. 39-42.

Development of use of Al for wire, cable, and bus bar. (T1, Al)

234-T. Extruded Aluminum Irrigation Pipe. *Modern Metals*, v. 6, Apr. 1950, p. 45-46.

(T3, Al)

235-T. Unusual Aluminum and Bronze Ceiling. *Sheet Metal Worker*, v. 41, Apr. 1950, p. 43-45.

Details of construction of ceiling in the lobby of an office building. Forming and spot welding operations. (T26, G general, K3, Al, Cu)

236-T. Why Beryllium Copper for Springs? *Mainspring,* v. 13, Apr. 1950, p. 1-5.

Physical and mechanical properties; design information.
(T7, Q general, P general, Cu)

237-T. A Light-Alloy Dragline Bucket Which Lasted Four Times as Long as a Steel One. (In French.) *Revue de l'Aluminium,* v. 27, Feb. 1950, p. 48-49.

British bucket, having a capacity of 17.7 cu. ft. which remained in service for 14 months and shifted nearly 3.5 million cu. ft. of sand before needing repairs. It is claimed that four equivalent steel buckets are worn out by the same amount of service. (T4, Al)

238-T. Research on Roadbed Materials and Problems in This Field. (In German.) Walter Janiche. *Stahl und Eisen,* v. 70, Mar. 2, 1950, p. 174-186.

An extensive survey of available information on railroad rails; factors affecting their mechanical properties; causes of fracture, wear, and corrosion; methods of testing and of welding. Test results show that a Cu content of 0.25% greatly increases wear resistance of rail steel. 31 ref.
(T23, Q general, R general, K general, CN)

239-T. Cost-Cutting Methods in Piston-Ring Production. George H. DeGroat. *Machinery* (American), v. 56, May 1950, p. 141-150.

Equipment and procedures of Piston-Ring Div., Koppers Co. Centrifugal casting from a high-strength Fe alloy, annealing, heat-forming, machining, and inspection.
(T7, E14, G17, J23)

240-T. Making a Half-Ton Spline Broach. *Machinery* (American), v. 56, May 1950, p. 151-153.

Broach was produced from a 4000-lb. ingot of 18-4-1 high-speed steel. Several reheatings and breakdown operations were required to forge the ingot into a suitable size for subsequent swaging. Machining operations included rough turning, drilling, thread cutting, grinding.
(T6, F22, G17, TS)

241-T. Aircraft Rivets. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 84-85.

Heading, heat treatment, and plating. Rivets are Al, Monel, and steel.
(T7, G10, J general, L17, Al, Ni, ST)

242-T. Materials Substitution Plan for Turbojets. *Aviation Week,* v. 52, May 8, 1950, p. 27-29, 31-32. Based on paper by Jerard M. Pederson.

Method offered for rating engines by critical element content to simplify achievement of "non-strategic" jets. The various high-temperature alloys are assigned alloy index numbers based on relative scarcity in the U. S. of the constituents. The same system is applied to engine components to obtain overall index numbers indicating relative scarcity of the metals used. Shows how the system may be used to select substitute metals and to redesign with availability of materials in mind.
(T25, SG-h)

243-T. Research Pays Off on Vacuum Cleaner Production. *Production Engineering & Management,* v. 25, May 1950, p. 57-64.

Miscellaneous equipment and procedures in production of Hoover vacuum cleaners. Includes foundry practice, presswork, machining, and finishing (painting and plating).
(T10, E general, G1, G17, L17, L26)

244-T. Aluminum Holds Protect Fish. H. C. Plummer. *Food Industries,* v. 22, May 1950, p. 121.

New type vessel compartmented and completely lined with aluminum. The lining material is 3/16-in. Alcan 57-S sheets. Pound-boards, shelves, and fish-room stanchions are 51-ST Al extrusions. (T22, Al)

245-T. Metals for Gas Turbines. Norman L. Mochel. *American Society of Mechanical Engineers,* Paper No. 49-A-85, Dec. 1949, 13 pages.

Reviews present situation for long-life gas turbines. Use of Al, Ti, Cr, Mo, W, and Ni alloys, as well as stainless and alloy steels for hot parts. 14 ref.
(T25, SG-h, Al, Cr, Mo, Ni, W, SS, AY)

246-T. Aluminum in Industry. J. J. Brown. *Canadian Metals,* v. 13, Apr. 1950, p. 6-8, 45.

Applications, principally as a material of construction. (T26, T5, Al)

247-T. Cold Forming Tools; Choice of Composition and Heat Treatment. *Iron and Steel,* v. 23, Apr. 1950, p. 141-144.

Carbon and alloy toolsteel compositions are discussed.
(T6, J general, TS)

248-T. Laws of Heating and Cooling of a Furnace With Constant Heat Supply. (In French.) Gustave Ribaud. *Comptes Rendus* (France), v. 230, Mar. 13, 1950, p. 1011-1015.

Analyzes the above for an empty furnace and for a charged furnace. Simplified formulas are proposed for calculation of heating and cooling in both cases. Formulas are interpreted for different values of variables. (T5)

249-T. NACA Studies Ceramals for Turbine Blading. *SAE Journal,* v. 58, May 1950, p. 40-42; discussion, p. 42. Based on "Review of NACA Research on Materials for Gas-Turbine Blades", by G. Mervin Ault and G. C. Deutsch. (To be printed in full in *SAE Quarterly Transactions.*)

Discusses primarily boron and titanium carbide types, including effects of addition of Co, W, and Mo to the latter. Graphs show trends of transverse rupture strength with temperature and composition.
(T25, Q27, B, Ti, SG-h)

250-T. How To Put Brass in a Band. Ray Fisher. *American Machinist,* v. 94, May 15, 1950, p. 89-93.

Production of band instruments by C. G. Conn, Ltd. Forming, bending, spinning, joining, heat treating, and finishing must be done with precision if the instrument is to pass the final electronic tone test. Although 654 raw materials are required, sheet brass is the principal one. (T9, G general, Cu)

251-T. High-Pressure Vessels in Coal-Hydrogenation Service. J. T. Donovan, M. Josenhans, and J. A. Markovits. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 357-363.

The converters must resist 10,000 psi. and 1000° F., also hydrogen attack and H_2S corrosion. The three different designs proposed by American manufacturers and the vessels accepted for the Bureau of Mines plant. The German spirally wound construction and its expected advantages. Materials include carbon steel and various alloy and stainless steels.
(T29, T26, CN, AY, SS, SG-h)

252-T. High-Pressure (10,300 Psi) Piping, Flanged Joints, Fittings, and Valves for Coal-Hydrogenation Service. J. H. Sandaker, J. A. Markovits, and K. B. Bredtschneider. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 365-372.

The piping components used in the coal-hydrogenation process and some factors considered in design. A short discourse on future design for commercial-scale plants. Carbon, alloy, and stainless steels used in various locations.
(T29, CN, AY, SS, SG-h)

253-T. Metallurgical and Fabrication Considerations in the Coal-Hydrogenation Demonstration Plant Construction. B. H. Leonard, Jr., G. D. Gardner, and J. A. Markovits. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 379-383.

Special equipment, special steels, and heavy wall thicknesses were required. Various metallurgical and fabrication problems encountered included hydrogen attack, high-temperature strength, welding, machining, choice of materials, defects, etc. Carbon, alloy, and stainless steels are used in various locations.
(T29, CN, AY, SS, SG-h)

254-T. Many New Applications for Powdered Metals. Joseph Geschelin. *Automotive Industries,* v. 102, May 15, 1950, p. 36-37, 118, 120, 122.

Fourteen manufacturers are listed together with specific powdered-metal products made by each.
(T general, H general)

255-T. For Trim Appearance. *Die Castings,* v. 8, May 1950, p. 21, 65-66.

Combined lawn edger and hedge trimmer with one-piece Al-alloy, die-cast housing, Cr steel cams, Ni steel gears, and toolsteel blades.
(T10, Al, AY, TS)

256-T. Handy Around the House. *Die Castings,* v. 8, May 1950, p. 22-24.

Miscellaneous household-appliance parts and gadgets die cast in Al or Zn alloy. (T10, Al, Zn)

257-T. Die Cast Accessories Increase Uses for Standard Appliances. *Die Castings,* v. 8, May 1950, p. 24.

Al die-cast household butter-churn lid. (T10, Al)

258-T. Alloy Stability Needed for Timing Controls. *Die Castings,* v. 8, May 1950, p. 25-26, 66-67.

Zn-alloy die castings in instruments for control, cycling, switching, and protection of machine operations. (T8, Zn)

259-T. Cost of Labor and Materials Reduced 20 Percent. *Die Castings,* v. 8, May 1950, p. 29, 68-69.

How change from sand-cast to die-cast Al alloy brackets for fractional horsepower motor reduced production costs by eliminating eight machines and four machining operations. Reduction in weight without loss of strength and greater ease in assembling were also obtained. (T1, Al)

260-T. Aimed for Profits. *Die Castings,* v. 8, May 1950, p. 30-32, 70.

Use of Zn die-cast parts for target pistols used in connection with an amusement-park game. Also use in coin-operated mechanisms.
(T10, Zn)

261-T. Fewer Parts; Stronger Structure. *Die Castings,* v. 8, May 1950, p. 33-35, 71.

Use of Zn-alloy die castings in Rex-O-Graph fluid duplicator.
(T10, Zn)

262-T. Printing Surface of Check Protector Has Special Dot Pattern. *Die Castings,* v. 8, May 1950, p. 36-38.

Method of production of die-cast Zn type with recessed dots. The type is cast along the edge of a curved steel segment. The dots must mesh exactly with cones on a brass matrix during the check-writing operation. The machine also includes other Zn die-cast parts.
(T10, E13, Zn)

263-T. Use of Die Castings in an Automatic Record Changer. *Machinery* (London), v. 76, Apr. 27, 1950, p. 613.

Use of Zn-base alloys. (T10, Zn)

264-T. Problems in the Use of Magnesium Alloys for Optical Instruments. (In German.) E. Neukirch. *Metall,* v. 4, Apr. 1950, p. 142-144.

The requirements of Mg alloys, such as degree of purity, permissible kinds and amounts of alloying elements, etc., for uses in optical instruments. Includes a discussion on the Heliarc-welding process and surface protection. 18 ref. (T8, K1, L general, Mg)

265-T. (Book) **Varnish Manufacture and Plant.** H. W. Chatfield. 429 pages. 1949. Leonard Hill, Ltd., 17 Stratford Place, London W.1, England.

Materials of plant construction and design of varnish-making plant, from the chemical engineering point of view. Chapter 2 outlines physical, mechanical, and chemical properties of cast irons, stainless and alloy steels, Ni alloys, Al, Cu, Sn, and Pb used. (T29, SG-g)

V

MATERIALS
General Coverage of Specific Materials

100-V. Characteristics of MX Steel. George R. Caskey. *Western Metals,* v. 8, Apr. 1950, p. 21-25.

Mechanical properties, machinability, etc., of new freer machining bessemer screw stock developed by Carnegie-Illinois Steel Corp., which speeds production, increases tool life, improves finish, and reduces down-time. Composition corresponds to B-1113 grade.
(Q general, G17, CN, SG-k)

101-V. General Controls at Glendale Cuts Costs—Ups Production With Freer Machining Steel. W. A. Ray. *Western Metals,* v. 8, Apr. 1950, p. 25.

Significant savings in production cost effected at General Controls Co., through use of MX bessemer steel. (CN, SG-k)

102-V. Techniques for Fabrication With Superalloys. Harley Rubish. *Western Metals,* v. 8, Apr. 1950, p. 34-35.

"Super-alloys" include both ferrous and nonferrous metals, development of which was begun early in World War II to permit manufacture of aircraft parts with superior strength properties at elevated temperatures. Properties of three typical groups are tabulated. Fabrication problems, and how they were solved by Stainless Steel Products, Inc. (SG-h)

103-V. Nodular Gray Iron Compared With Other Cast Ferrous Metals. G. Vennerholm, H. Bogart, and R. Melmoth. *Materials & Methods,* v. 31, Apr. 1950, p. 51-55.

Evaluates new irons, variously known as ductile, spheroidal, or nodular iron; indicates that they have a wide range of potential engineering applications, and in many cases can compete with steel and malleable castings. (CI)

104-V. Beryllium Copper. John T. Richards. *Materials & Methods,* v. 31, Apr. 1950, p. 75-90.

See abstract of "What Beryllium Copper Offers the Designer," *Machine Design,* item 23C-53, 1949. (Cu)

105-V. Wrought Phosphor Bronzes; Typical Properties. *Materials & Methods,* v. 31, Apr. 1950, p. 91.

Table lists composition; physical, mechanical and fabricating properties; corrosion resistance; available forms; and uses of four types. (Cu)

106-V. Recent Research in Light Alloys Performed in France. (In French.) G. Chaudron. *Revue de Métallurgie,* v. 47, Feb. 1950, p. 93-103.

Emphasis on Al and its alloys. 34 ref. (Al)

107-V. Industrial Cost Cutting With Cerro Alloys. O. J. Seeds. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 82-83.

Cerro alloys are low-temperature-melting alloys whose predominant component is bismuth. Several of the alloys are eutectics: Cerrobase is the eutectic of Bi and Pb; Cerrobend is the eutectic of Bi, Pb, Sn, and Cd; and Cerrotru is the eutectic of Bi and Sn. The noneutectics are: Cerrosafe (Bi, Pb, Sn, and Cd); and Cerromatrix (Bi, Pb, Sn, and Sb.) Physical properties and applications. (Bi, SG-d)

108-V. Characteristics and Properties of Cast Low Chromium-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *Transactions of American Society for Metals,* v. 42, 1950, p. 175-204; discussion, p. 204-205.

Previously abstracted from Preprint. See item 3B-197, 1949.
(P general, Q general, K9, M27, CI)

109-V. Fabrication and Mechanical Properties of Ductile Zirconium. E. T. Hayes, E. D. Dilling, and A. H. Roberson. *Transactions of American Society for Metals,* v. 42, 1950, p. 619-640; discussion, p. 640.

Previously abstracted from Preprint. See item 3C-190, 1949.
(Q general, F general, G general, J23, Zr)

110-V. The Metallurgy of Beryllium. Albert R. Kaufmann, Paul Gordon, and D. W. Lillie. *Transactions of American Society for Metals,* v. 42, 1950, p. 785-844.

Part I: Methods for producing pure beryllium and techniques for melting and casting, extrusion and rolling on a commercial scale. Metallography, recrystallization and preferred orientations. Part II: Behavior under tensile stress both at room temperature and at high temperature. No explanation of the brittleness of beryllium was found. (Portion on metallography previously abstracted in *Metal Progress,* item 11-365, 1949.) 29 ref.
(C general, F general, M general, N5, Q23, Be)

111-V. Aluminum-Zinc-Magnesium Alloys; Their Development and Commercial Production E. H. Dix, Jr. *Transactions of American Society for Metals,* v. 42, 1950, p. 1057-1127.

1949 Edward de Mille Campbell Memorial Lecture. Metallurgical phases of the development and production of Alcoa 75S alloy, with particular emphasis on resistance to stress-corrosion cracking. 48 ref. (Partially abstracted from *Metal Progress,* item 6D-39, 1949.)
(R1, Al)

112-V. New Aluminum-Zinc-Magnesium-Copper Casting Alloys. W. E. Sicha and H. Y. Hunsicker. *American Foundrymen's Society,* Preprint No. 50-14, 1950, 9 pages.

Investigations have led to two new compositions: A612 (6.5% Zn, 0.7% Mg, 0.5% Cu, 0.15% Ti) for sand casting, and C612 (6.5% Zn, 1.0% Fe, 0.5% Cu, 0.35% Mn, 0.10% Ti) for permanent mold casting. Mechanical properties; aging, brazing, and casting characteristics; and resistance to corrosion and stress-corrosion cracking.
(E11, E12, Q general, K8, R general, Al)

113-V. Development of High-Strength Magnesium Casting Alloy ZK61. J. W. Meier and M. W. Martinson. *American Foundrymen's Society,* Preprint No. 50-43, 1950, 8 pages.

Investigation of experimental heat treatments to obtain maximum properties of alloy ZK61 (6% Zn and over 0.7% Zr). Comparison of mechanical properties of various ferrous and nonferrous casting alloys shows that ZK61 has the highest strength-to-weight ratio found in any commercial casting alloy. 29 ref.
(J general, Q general, Mg)

114-V. The Role of Nickel in Cast Bronze. G. S. Farnham. *Canadian Metals,* v. 13, Apr. 1950, p. 20-23, 49.

A survey. Table gives applications, mechanical properties, and chemical compositions of 27 types identified by Inco Specification Number. (Cu)

115-V. Some Properties of Tantalum. Rupert H. Myers. *Metallurgia,* v. 41, Apr. 1950, p. 301-304.

Results of experiments on effect of deformation and annealing on some mechanical and physical properties of Ta. The hardening of Ta when heated in an imperfect vacuum was studied. Deformation lowers softening temperature from 650 to 450° C., but has no effect on electrical resistivity. (Ta)

116-V. Contribution to the Study of the Stainless Ferrosilicons. (In French.) Robert Lefébure. *Métaux & Corrosion,* v. 25, Jan. 1950, p. 9-29; Feb. 1950, p. 44-53.

A comprehensive review including constitution diagrams of Fe-Si and compositions of stainless binary alloys. Methods of production and physical and chemical properties. Feb. installment shows that electrical resistance, magnetic sensitivity, and coefficient of expansion increase with concentration of Si. Presence of other elements causes a decrease in these properties (except electrical resistance). 56 ref.
(M24, P general, SS)

117-V. Electrolytic Manganese. (In French.) Ch. Tschappat. *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, Nov.-Dec. 1949, p. 133-134; v. 59, Jan.-Feb. 1950, p. 15-17.

Transformations and crystal structure. Concluding installment describes U. S. installations for production of electrolytic manganese, and methods of operation.
(N general, M26, C23, Mn)

118-V. Nodular Iron Finds Favor With Ford. *SAE Journal,* v. 58, May 1950, p. 31-34. Based on "Nodular Cast Iron", by Gosta Vennerholm, H. N. Bogart, and R. B. Melmoth. (To be published in full in *SAE Quarterly Transactions.)*

See abstract of "Nodular Gray Iron Compared With Other Cast Ferrous Metals", *Materials & Methods,* item 103-V, 1950. (CI)

119-V. Industrial Applications of Metamics. W. O. Sweeny. *Tool Engineer,* v. 24, May 1950, p. 21-23.

"Metamics" are metal-ceramic products made by Haynes Stellite Div., Union Carbide and Carbon Corp. Miscellaneous physical and mechanical properties, present and potential applications. Compositions are not given. (SG-h)

120-V. Titanium, Metal of the Future. *Mining Journal* (London), v. 234, Apr. 28, 1950, p. 421-422.

Properties, applications, ore resources, and methods of recovery. (Ti)

121-V. Fusible Alloys Containing Tin. 24 pages, Sept. 1949. *Tin Research Institute,* Fraser Rd., Greenford, Middlesex, England.

Composition, physical and mechanical properties, aging, corrosion, foundry practice, working, and uses

of the tin that melt at relatively low temperatures. Does not include solders or amalgams. 19 ref. (Sn, SG-d)

122-V. (Book) Extraction and Fabrication of Aluminium. 115 pages. 1949. Northern Aluminium Co., Ltd., Banbury, Oxfordshire, England.

The first section deals with extraction—its historical associations, sources of Al ores and bauxite, mining and preparation of alumina, and details of the world's production of Al and bauxite. Part two covers the properties and part three fabrication of Al and its alloys, including remelting, pouring, cast structures, rolling sheet, hot rolling, annealing, cold rolling, finishing, extrusion, presses, heat treatment, drawing, forging, sand casting, die casting, etc. A final section briefly describes and illustrates varied uses. (Al)

123-V. (Book) Le Magnésium et les Alliages Ultra-Légers. (Magnesium and Ultra-Light Alloys.) Paul Bastien. 104 pages. 1948. Dunod, 92 rue Bonaparte, Paris 16, France.

Short but comprehensive review covering raw materials, methods of production, physical, chemical, and mechanical properties, phase relationships and transformations, foundry practice, fabrication, etc. 89 ref. (Mg)

National Metal Congress and Exposition
Chicago—Oct. 23-27, 1950

New Names Added to Quarter Century Club

Detroit Chapter—B. B. Beckwith, Clete L. Boyle, L. A. Danse, W. R. DeGowin, J. Arthur Durr, C. L. Foreman, R. J. Hoensheid, W. E. Jominy, Chester Kondy, H. W. Lipke, Percy B. Lowery, R. G. McElwee, H. W. McQuaid, H. T. Morton, Richard Schneidewind, William Telfer, Leo L. Vasold. Sustaining memberships: Bethlehem Steel Co., Bower Roller Bearing Co., Columbia Tool Steel Co., Dearborn Chemical Co., Driver Harris Co., General Alloys Co., Great Lakes Steel Corp., Republic Steel Corp.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

Overseas

MINING ENGINEER FOR GREECE: Ability to screen loans for mine rehabilitation, advise on modernization methods, report on mining industry in Greece, make market studies of Greek minerals, bauxite, magnesite, pyrite, lead and zinc. Should know modern mining methods. Able to survey and classify partly developed mineral areas and stimulate productivity. Two year appointment. $9150 per year plus allowances. Box 6-5.

East

DIE-CASTING ENGINEER: Large New England concern has opening for qualified die-casting expert. Should be thoroughly competent in all phases of die-casting business, die making, operation of equipment and maintenance. Should be capable of running zinc and aluminum castings of all sizes to a hardware finish. Must have proven background. Minimum 10 years experience. Excellent opportunity. Top salary. Box 6-10.

TEACHING: Position open September 1. Rank of instructor or assistant professor. E.C.P.D. accredited metallurgy curriculum. Graduate work leading to M.S. available. Part-time research. Box 6-100.

Midwest

METALLURGIST: Recent graduate, M.S. preferred, for physical metallurgical research on ferrous metals. Position permanent, with excellent opportunities. Located in Ohio. Box 6-15.

SALESMAN-METALLURGIST: Training in metallurgy or metallurgical engineering and minimum of one year's experience either as salesman or metallurgical contact man. To promote, sell and control inventory of alloy steels. State age, training, experience and salary expected. Box 6-20.

FERROUS METALLURGIST: Age 30 to 35, B.S. degree, 5 to 10 years industrial experience. For laboratory development and plant liaison on new products and improvements. Must be thoroughly familiar with heat treatment of low-alloy steels. Experience with rolling and forging processes; technical report writing desirable. State expected salary. Box 6-25.

West

METALLOGRAPHER: Pacific Northwest aluminum manufacturer has opening for experienced man. Metallographic experience in light alloys desirable. In reply, please submit details of education, experience and salary requirements. Please enclose recent photograph. Box 6-30.

Positions Wanted

STAINLESS AND ALLOY STEEL METALLURGIST: Outstanding record of accomplishment during 17 years work with technical development, manufacture and fabrication of stainless and alloy steels. Author of published papers. Demonstrated administrative ability, cooperative worker. Will assume responsibility for quality control and customer satisfaction. Can also take full charge of development and research program. Box 6-35.

METALLURGIST: Age 27, veteran. Mechanical engineering degree, plus extensive study (metallurgical subjects) at Stevens Institute of Technology graduate school. Two and one-half years experience in large steel warehouse as alloy steel metallurgist. Knowledge of business and sales methods. Desires position with responsibility and opportunity in production or technical customer contact work. Location northeastern U. S. Box 6-40.

METALLURGICAL ENGINEER: B.S., Carnegie Institute of Technology, 1950. Age 31, married, veteran. Development, production and control are major interests. Four years of foundry control and four years of part-time development work. Will consider any location but wish to settle in western Pennsylvania. Box 6-45.

PRODUCTION ENGINEER: Age 39, E. Met., M.S. Experienced as metallurgist and superintendent in steel mill and foundry, electric-arc and induction melting, process control, statistical quality control, cost analysis. Progressive, aggressive, capable. Desires responsible position in supervision, technical control or development. Box 6-50.

MECHANICAL ENGINEER: B.M.E., Cornell University, 1949. Desires position in production or maintenance engineering. Some experience in building trades and automatic machinery operation. Single, age 22. Location not important. Box 6-55.

METALLURGIST: B.S. in metallurgical engineering. Experience includes one year of university teaching and four years experience in malleable work including sand control laboratory, annealing, melting and coreroom work. Desires to locate in the Midwest in a responsible metallurgical capacity. Box 6-60.

SALES ENGINEER: B.S. and M.S. in metallurgy. Interested in a position in sales department of a large manufacturer using ferrous materials. 26 years old, married, no children. Will travel. Location not important. Box 6-65.

METALLURGIST: Mechanical engineer. Age 25. Experience in surface finishing (especially plating and chemical treatments) and metallography. Studying for M.S. in metallurgy. Has M.E. degree. Machine shop background. Will relocate. Box 6-70.

PRODUCTION ENGINEER: Graduate industrial engineer. Age 38, married. Ten years experience in fabrication of all sizes of sheet metal assemblies from stainless and mild steel by drawing, welding and machining. Has charge of 200 technical and professional people in following: tool and product estimating, methods, tool design, tool manufacture and plant maintenance. Box 6-75.

METALLURGICAL ENGINEER: B.S. from Purdue University, June 1950. Age 23, single. Desires to be an executive secretary where a knowledge of metallurgy is necessary. Also interested in foreign work. Has a working knowledge of accounting, typing, shorthand and business letter writing. No preference as to location. Box 6-80.

STEEL COLD EXTRUSION SPECIALIST: Metallurgical engineer, Sc.D., experienced in all phases of development and fabrication procedures of cold extruding steels, especially in manufacturing, cold working, surface treating, heat treating and quality control of steels suitable for the cold extrusion process. Currently employed, desires responsible position in research, development, process control or as consulting metallurgist. Box 6-85.

METALLURGIST: Single, 24 years of age. Graduate of Notre Dame with B.S., August 1950. Disabled veteran. No experience in industry as metallurgist. Has done mechanical work on automobiles and has had some sales experience outside field of metallurgy. Will consider any location for employment. Hopes to advance by going to night school. Box 6-90.

CHIEF METALLURGIST: Of large Eastern fabricator desires Midwest position. Sixteen years experience in laboratory supervision, specifications, equipment and procedure recommendations, research troubleshooting. Specialist on stainless steel; well-versed on fabrication of ferrous and nonferrous materials. Age 39, married. M.S. in metallurgical engineering. Registered engineer. Publications, patents. Present salary $6200. Box 6-95.

METALLURGICAL ENGINEER: Graduate of Virginia Polytechnic Institute, B.S. in Met. Eng.; age 22. Prefers training program in any phase of metallurgy leading to a responsible position. Location immaterial. Box 6-105.

CHIEF METALLURGIST — TECHNICAL MANAGER: Twelve years extensive experience in development, service and consulting work; Eight years of administrative responsibility and product design, 7 years process development, both ferrous and nonferrous. Specialist in metallurgical design and fabrication, refractory metals, vacuum techniques, induction heating, heat treatment, X-ray. Married, age 33. Registered engineer; degree Carnegie Tech. Available immediately. Box 6-110.

EXPERIENCED METALLURGIST: B.S. in Met., 1941. Well-rounded experience in research, development and production. Excellent man for metal fabricating plant requiring metallurgist with imagination, resourcefulness, and executive ability. East coast location. Box 6-115.

WELDING ENGINEER: B.M.E., M.M.E.; age 29. Three years in engineering department, consultant on welding problems, codes, and assistant department head, fabrication division. Two years experience in welding, heat treating and fabricating alloy and stainless steels. Two years teaching welding engineering. Desires position with consultant, as department head, or teaching. Box 6-120.

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